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Japanning Metal Parts

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Black Finishes on Metal Easily and Economically Produced. Various Finishes and Production Methods

WHILE users of finishing materials are in more or less of a quandary regarding the status of new synthetic finishes, baked japanning on metal goes merrily on, with only here and there a slight interruption due to the presence of quick-drying finishes in the field.

The baking of colored enamels has always been somewhat limited as to variety of colors and it is here where we may expect the newer group of finishing materials to gain a strong foothold. However, insofar as baked black finishing methods are concerned it will be a long time before any new method will supplant them. This statement is made because of the low cost of the materials used and the speed with which the finish may be applied.

One hears a great deal about the new finishes which dry in one hour and of lacquers which dry in half an hour but few realize that under proper production conditions black japanned finishes are faster because it is possible to produce a hard finish in fifteen minutes.

For certain classes of work, where the time element is an important item, the usual type of air-drying varnish is not suited. Considerable time is required for the drying and hardening of the film and this means that in quantity production large drying-room capacity must be provided and a large amount of product is tied up in the finishing department. To meet the demand for a quick drying, highly-resistant, touch varnish on metal, baking japans were developed.

Baking japans are hardened by baking in ovens at 325 to 450° F., ordinarily in from one to three hours, instead of being hardened at room temperatures.

Because of the higher temperatures used in the oxidation baking japans require little drier and permit the use of semi-drying oils, such as tung oil, soya bean oil and menhaden fish oil, all of which give greater elasticity and weather resistant properties to the ultimate finish.

Because of the high temperatures used in drying the film tends to remain soft until almost completely dried, allowing more complete annealing and eliminating some of the tendency to cracking and checking due to the strains set up during the drying period.

Ordinary baking japans are, as a matter of fact, simply long-oil varnishes made up of a combination of drying and semi-drying oils with very small amounts of drier. The temperature at which it is to be baked and the color of the article to be coated determines what gums can be used. The higher melting copal gums are usually used in the better grades of baking japan. Thus, it is readily seen that while the term "baking japan" is applied to these products they are, in reality, clear baking varnishes.

By substituting asphaltum for copal gums the result is a dense black baking varnish which is called as "black baking japan".

Rubber First Coats

Rubber first coats which are used **under** black baking japans to offset the deficiency in color density are simply black baking japans, high in pigment and volatile content with gilsonite baking varnish as a vehicle. The gilsonite varnish serves to withstand the high temperatures to which the baking japans are subjected. There is a high percentage of pigment and

volatile content to dull the luster to prevent the high gloss baking japan from crawling but at the same time filling up the imperfections in the metal.

Rubber first coats contain considerable quantities of oil, so as not to become brittle, as it is necessary for them to withstand two or more bakings at elevated temperatures. On account of their different compositions it is almost impossible to have mixtures of

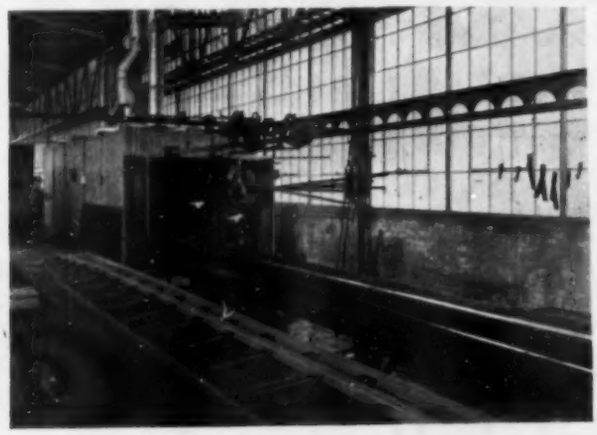


Fig. 1. Japanning Airplane Body Parts

pigment and gilsonite varnishes entirely free from silking. However, they are, as a rule, used as an undercoat hidden by subsequent coats of baking japan.

Wrinkle Finishes

It is most essential that the metal which is to be finished with wrinkle japan be thoroughly cleaned to make it free from foreign matter and from grease. After the metal has been cleaned one coat of wrinkle japan should be applied directly to the metal. After this material is applied and subjected to baking, the top surface of the finish alternately expands and contracts into a series of irregular ridges and valleys extending over the entire surface. This represents one-coat work.

Light shades of wrinkle japan should be baked at 180° F. for two hours in an oven free from foul gas. Darker shades may be baked at a temperature ranging from 200°F. to 240°F. for two hours. On light shades if the temperature is permitted to run over 180°F., discoloring will take place.

The two-coat wrinkle finish includes one coat of wrinkle undercoater which is applied directly to the metal and baked at 180°F. for two hours, in an oven free from foul gas. After the wrinkle undercoat has been baked it should be allowed to cool sufficiently. The second coat consists of a nitrocellulose lacquer which is applied directly over the wrinkle undercoater.

To produce a copper wrinkle finish it is necessary to mix a quantity of copper bronze with dull black lacquer, reduce the lacquer with equal parts of thinner and spray a coat of this over the wrinkle undercoater. It is also necessary to remember that if to much lacquer is applied it will cause the undercoat to soften up and this will retard the drying of the lacquer.

Should one find that the wrinkle japan or the wrinkle undercoat has not wrinkled sufficiently it will be found that the difficulty is generally due to uneven application, or, to insufficient application of the wrinkle material. Then too it may be possible that non-wrinkling might be due to the metal being improperly cleaned—possibly due to the presence of grease or some foreign matter.

But let us take a concrete example and follow the various steps through which the production process of japanning pass.

Continuous Japanning

We have taken the following notes and data from the actual operation of a continuous japanning oven used to japan parts for railroad-signal and train-control equipment. The oven in question is 4 x 10-foot by 11 feet high for loading and dipping, and a 6 x 15-foot by 12 feet high section for baking and cooling. The latter has a floor three feet above the lower section acting as the cooling chamber. Oven walls are of double steel sheets with four inches of insulation between. The insulation is so perfect that the drop in oven temperature, an hour after the burners and exhaust fan have been shut down, is only ninety degrees.

Parts pass through on a continuous chain conveyor 36-inches wide, with cross bars 26-inches apart on which parts are hung by means of wire hooks. The conveyor passes an opening at the feed end for loading, then downward nearly to the surface of a dip tank or trough, upward over a baffle wall separating dipping chamber from oven, through the oven, down to the cooling chamber and through to the feed end.

Sprockets in the oven are so placed that the conveyor forms loops to increase the period under heat. A 1-h.p. motor drives the conveyor through a spur-speed transmission. The main drive sprocket is connected through spear pins so that the stoppage of the conveyor cannot cause serious breakage.

Baking japan is placed in a trough shaped tank. At the slow speed of the conveyor most of the excess japan drips off the parts onto a sloping drip plate and thence back to the tank.

The Oven Heat

Four atmospheric gas burners using gas at a line

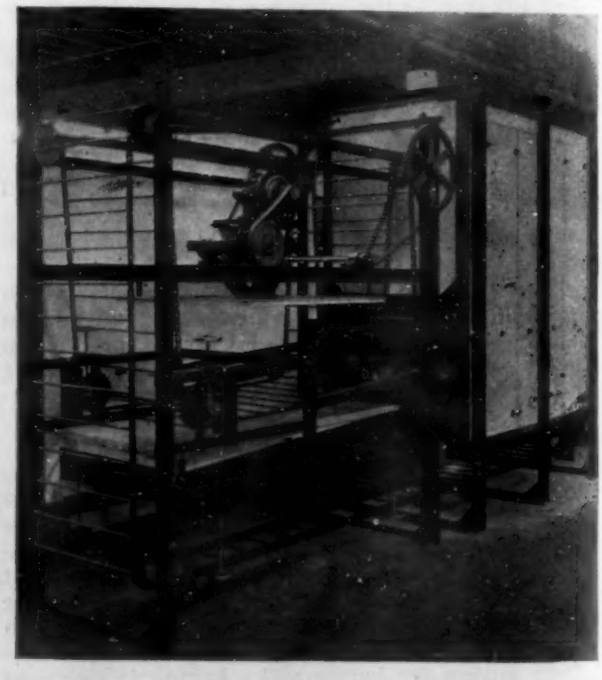


Fig. 2. A Continuous Japanning Outfit for Small Brass and Steel Novelties

pressure of 6-inch water column are spaced about 24-inches apart at the bottom of the oven. Each is enclosed in a metal chamber 5-inches wide and 10-inches deep, extending across the oven and entering vertical ducts along the side walls which carry gases of combustion to the top of the oven chamber. The flame heats the oven through walls of the burner chambers and ducts, the gases of combustion entering the oven at considerably reduced temperature.

An automatic temperature control device holds any desired temperature and is set for 425-degrees F. A recording thermometer gives a permanent record of heat. A small induced draft fan driven by a ½-h.p. motor is so located as to remove japan fumes and gases of combustion from the oven.

The pieces japanned vary so widely in shape, size and weight that no enumeration is possible, in this partcular instance. Three typical parts of the pieces we are considering, of which large quantities are run, are iron receptacle covers or caps, iron junction boxes and aluminum classification lamps. These weigh 5-ounces, 3-pounds and 4½ pounds, respectively.

Cycle of Operation

All parts are brought to the oven from the shops in small wheeled boxes from which the operator hangs them on the conveyor bars by means of small wire hooks. Under normal operation one part is hung on a hook, but when it is necessary to force production, multiple hooks, holding as many as twenty five pieces are used.

It requires about an hour and a half to complete the circuit from the time the parts are hung on the conveyor until they are removed by the same operator. In rush periods the cycle has been reduced to an hour or an hour and a quarter. Upon removal the parts are placed in boxes for transmittal to tapping machines. In this plant it is necessary to tap the pieces after japanning, as otherwise the threads would become clogged with japan—unless the finish be applied with a spray gun. An exception is made in the case of junction boxes, which are tapped first and their tops screwed on before going through the japanning oven.

All parts are given one coat, the thickness and degree of hardness being determined by the character of bath and time of baking.

Burners are in operation ten hours daily being lighted at 1 A.M. to bring the oven up from 70° to 425°F. by 8:30 A.M., thus permitting eight hours of actual japanning. During a half-hour period at noon no parts are fed to the oven, the burners serving merely to keep the oven temperature up to the required heat.

Maintenance

The cleaning and greasing is all done on Saturday or Sunday, the operator spending 30 minutes for complete greasing and two hours for cleaning and renewing the japan supply. Due to exposure to heat lubrication of the conveyor chain is accomplished by a special conveyor oil. The gas burners with their automatic control relieve the operator of all attention rather than lighting them in the morning and turning them off at night.

Gas Consumption

The initial heat requires 900 cubic feet at a rate of 600 cubic feet per hour. A full charge is always in the oven. While loading at an average rate of 350-lb. per hour the gas consumption is 500 cubic feet per hour. During the noon shutdown the consumption is 220 cubic feet—to hold the rate of 440-cubic feet per hour. The average daily consumption is 5200-cubic feet when the plant is busy.

Weights vary greatly and bear no relation to the capacity of the oven, which depends on the size, shape and consequent number of parts which may be hung from one conveyor bar.

Freedom from fumes, due to effective exhaust and absence of dirt or oil around the oven, have made japanning a very clean operation.

Close automatic control has held an absolutely uniform temperature, the recording instrument charts showing no visible variation from regulator setting. Thus the quality of work is uniform under all conditions of loading.

Japanning Costs

Operating costs on the oven equipment, with unit costs per 100-pound of mixed output, have been obtained. Fixed costs are based on a twenty-year life, which is considered fair in view of the fact that less than five productive hours have been lost in two years of service. An allowance of $175 per year is made for lubrication, cleaning, maintenance and repairs. The total annual charges amount to $541.75 or $1.81 per day.

Other daily operating costs are for labor, power, japan and gas, and are set up in two columns for maximum and average output. Only the last two items are variable. Japan costs are taken at the average consumption of four gallons a day, and gas is charged at the measured rates of consumption.

The totals are $14.42 and $14.36 for maximum and average outputs. Units costs are $0.428 per 100-pounds at maximum output and $0.502 at average output.

Actual maximum output of the oven cannot be determined under present operating conditions.

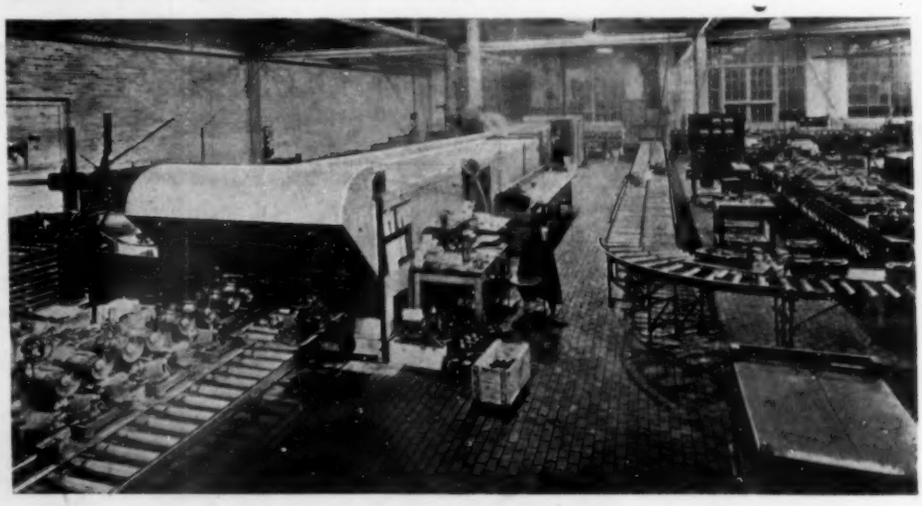


Fig. 3. Baking Enamel Electrically on Small Machine Parts

Stamped Metal Products Manufacturing

By W. B. FRANCIS

Associate Editor

A Series of Articles on the Processes and Methods Involved in Making Stamped Metal Products Preparatory to Plating and Finishing—Part 2*

DRAWING SHEET METALS

BESIDES the cutting of sheet metals to the shapes that may be required for making various articles, these blanks must be formed, usually to various contours of depth, by pressing processes known as drawing. The principle of a simple drawing operation is illustrated in Fig. 3, in which a circular blank **A** of sheet metal is drawn into

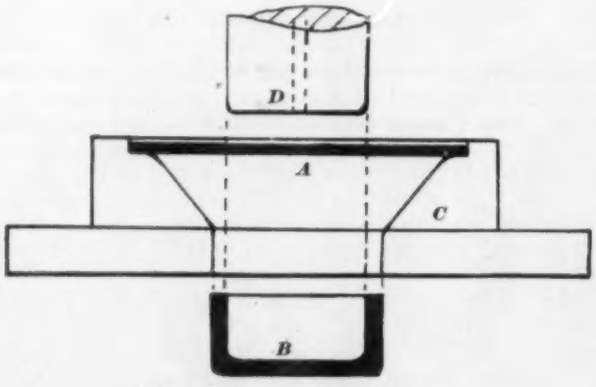


Fig. 3. Simple Drawing Dies

a shell or cup **B**. This cup is produced by placing the circular blank on an annular support in the die **C**, which has a conical hole with a bottom opening of the diameter required on the cup. Then the punch **D** is forced down by the press so as to drive the blank through the bottom opening, thus drawing the cup **B**.

As the cup is gripped on the end of the punch, its removal requires a stripper, which in this case is the lower edge of the die. The top edge of the cup strikes this edge as the punch ascends so that the punch pulls out of the cup, leaving the latter to fall

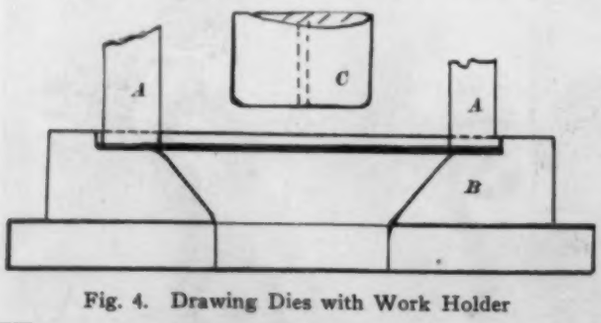


Fig. 4. Drawing Dies with Work Holder

*Part 1 was published in our January, 1935 issue.

out through a hole in the side or bottom of the press. When the lower edge of the die cannot be used as a stripper, spring actuated fingers are used. As the flat sheet becomes cup-shaped, it encloses air, and to prevent this air being compressed and distorting the work, it is necessary to use a vent hole through the punch as shown by the dotted lines.

In drawing thin sheet metals, which is done with the sheet unheated, there is a strong tendency for the cups or shells to wrinkle around the sides. In order to prevent this defect on the product, which makes the finished work unsightly or unfit for many kinds of service, a blank holder is attached to the die. This is illustrated at **A** in Fig. 4. The die **B** resembles that in Fig. 3, but the punch **C** is surrounded by the hollow blank holder **A** that moves ahead of the punch and grips with considerable force the annular surface of the blank to that of the die. The descending punch that follows the gripping operation not only forces the blank through the die, but draws the sheet out of the grip of the blank holder around the edge of the blank. The pulling action in drawing the sheet from the blank holder irons out any wrinkles that may tend to form while reducing the diameter of the blank. The pressure of the blank holder may be applied by springs or by a compressed rubber cushion. The mechanism of the press is arranged to

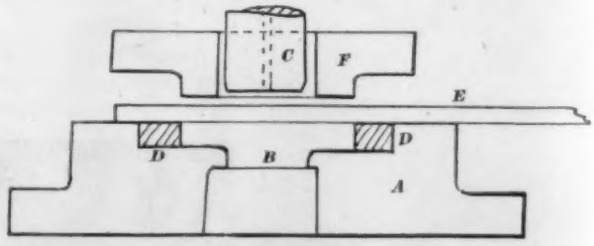


Fig. 5. Combination Dies

give the required movement and pressure. For deep drawing it is often necessary to vary the pressure on the blank holder so as to prevent tearing the metal and also not to overload the press. Various mechanisms have been devised to release the pressure or to increase it as may be needed on different areas of the work.

Instead of having the blanks or stampings cut in a punch press and the drawing done on a separate press, combination cutting and drawing dies are used to produce many kinds of articles. This method greatly increases the rate of production. A combination die is illustrated in Fig. 5. The die **A** not only has a bottom

opening **B** as needed for drawing the cup by the punch **C**, but it also has an inserted steel ring **D** for cutting the blanks from the sheet stock **E** by the second or hollow punch **F**. This cutting punch acts also as a blank holder to prevent wrinkles.

As many articles drawn from sheet metals, especially the shallow covers as used on containers, require some ornamentation on their flat surfaces, this embossing is done by the addition of an extra die to the combination dies, and a triple action press must be used. A die arranged for embossing is illustrated in Fig. 6. The cutting and drawing features may be similar to the dies previously described. But a larger

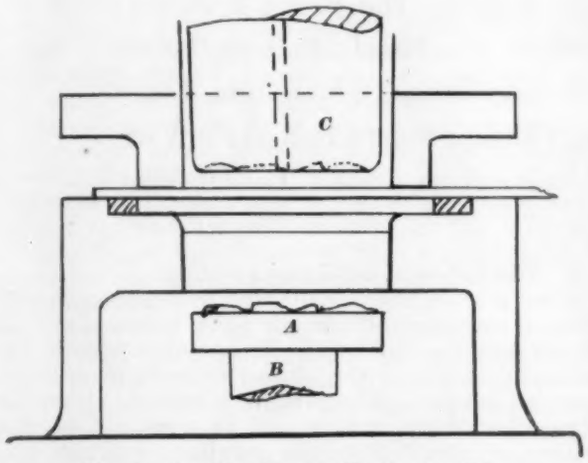


Fig. 6. Combination and Embossing Dies

cavity is provided under the cutting die so as to enclose the embossing die **A.** The end of the draw punch **C** must be cut to register with the letters or ornamental design on the embossing die. The blank is cut and then drawn, and the punch pushes the cup further downward until its bottom rests on the die **A.** The upstroke of the plunger **B** completes the embossing action.

A drawing, or reducing press, requires a longer stroke than the punching or stamping press. As the operation of drawing dies requires the press to be under load for the greater part of the stroke, such presses are usually geared. Also, instead of a crankshaft, a toggle action is often used to apply the pressure. A typical drawing press for moderately deep drawing is illustrated in Fig. 7. The gearing and power drive are omitted from the illustration. This press also has inclining legs in common with those presses used for any service where the work may slide out the rear of the press when it clears the dies. On the other hand, a large hole through the bed permits the drawn work to fall through when desired. With combination dies in multiple on a wide high-powered press, a very large quantity of pieces can be produced per day.



Fig. 7. Drawing Press

This series will be continued in an early issue.—Ed.

The Fabrication of Silver Chemical Equipment

As a part of a survey of existing and potential uses of silver made under a research associateship established at the National Bureau of Standards, Washington, D. C., by a group of American silver producers, the field of silver chemical manufacturing equipment has been studied. An item on page 92 of Technical News Bulletin No. 210 (October, 1934) covered the resistance of silver to corrosion by various agents. The methods of fabricating silver equipment are now being studied, as well as the properties of silver.

Equipment which requires the use of silver may either be made entirely of fine silver or it may be lined by one of three methods: by fitting in thin silver linings; by electroplating; or by using a duplex material.

Fine silver equipment is the simplest to construct and is much used. It offers the advantages of easy reclamation of the silver when the equipment has served its useful life, since it does not have to be separated from another metal. The comparatively low strength of silver is a serious disadvantage for work at high pressure, particularly if the temperature is also high.

A common method of lining a piece of apparatus with silver is simply to fit silver sheets or other fabricated forms of silver snugly inside a shell of a base metal. The space between the lining and outer shell is made as small as possible by hammering the silver lining tightly against the casing. Such equipment is very serviceable and the silver can be easily reclaimed. The heat transmission of such apparatus is relatively poor.

Electroplated vessels of large size have been made, but considerable care is necessary in doing the plating work if an impervious coating is to be obtained.

Duplex material consisting of silver joined to a base metal—for example, a bimetallic sheet—has been used for small pieces, and interest is developing in the possibility of using this method in larger construction.

Silver can readily be soldered with either soft or silver solder. It can also be welded. When the sheets of silver are thick, the welding process may be carried out in much the same manner as in welding steel. Some operators use a flux while others prefer to weld the bare metal.

The Effect of Some Mill Variables on the Gauge of Sheet Brass

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In General the Variables Encountered in Mill Practice Which Greatly Influenced the Gauge of the Sheet Metal Were: 1. The Roller's Ability; 2. The Heat of the Rolls; 3. The Width of the Metal; 4. The Reduction Per Pass; 5. The Temper of the Metal. Those Which Had Little Bearing Were: 1. The Speed of Rolling (Within Stated Range); 2. Variations in Cast or Overhauled Bar; 3. Oxidation from Anneal. Conclusion*

7. Reduction per Pass Through the Rolls.

The greater the number of passes the more uniform is the resultant gauge. This has long been an axiom of rollers. The truth of this statement was demonstrated in several ways, two of which are given below.

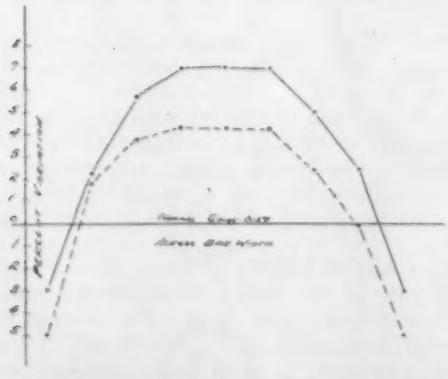
A batch of 15 bars of 6½ high brass was given a standard mill processing.

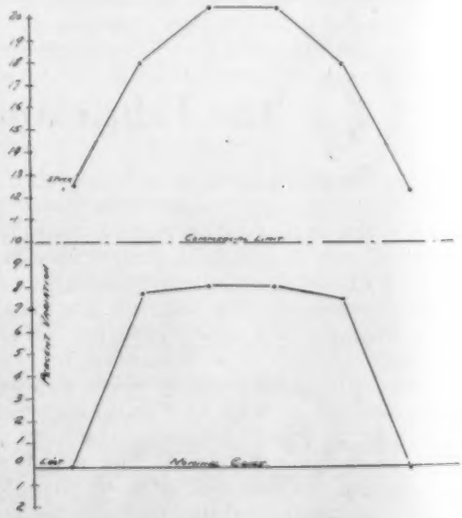
Soft stock at	.128"
1 Tandem pass to anneal	.050"
1 Tandem pass to anneal	.025"
3 single passes to	.0159"

Gaugings of the bars through .025 showed them to be within the commercial limits. A batch of 5½" high brass was taken and given processing as follows:

Soft stock at	.128"
1 Tandem pass to	.040"
1 Tandem pass to	.020"
1 Tandem pass to	.015"

The variation curves of these two lots are shown on Figs. 10 and 11. There the differences in gauge uniformity especially as to end to end variation, are readily perceptible.





Figs. 10 and 11.—Effect of reduction per pass

Hence—

Point 10. The amount of reduction per pass has a direct bearing upon the resultant uniformity of gauge.

8. The Effect of the Rollers Ability.

Were a brass mill so situated in business that the product consisted of one size, one mixture, and one temper of brass, it would be a comparatively easy matter to eliminate the human element in rolling to accurate gauges. The weight, material, speed, and lubrication of the rolls would be a matter of exact design, calculated from the resultant constant pressure of a constant reduction of metal. During the active pass the heat of the rolls could be measured and would be constant; hence a standard shape could be adhered to, since one width of bar would mean one length, the rate of flow of cooling water, both on the roll face and the neck face could be increased, as the bar passed through the rolls, to keep the rolls at constant conditions on every stand, a definite plan of reduction relation between center and edge of the sheet could be worked out to obtain perfect parallelism of the finish gauge.

But with conditions as they are in the form of so many variable widths, gauges and thus lengths, tempers and mixtures, the roller is about 90% responsible for the condition of the finished sheet. True, he

*Parts 1, 2 and 3 were published in our August, September and December, 1934 issues.—Ed.

cannot finish metal accurately in one pass that has major irregularities, but he can by lack of attention turn out non-uniform work at the ready gauge, even if all other conditions are perfect. Starting in the morning he may be required to roll from .032" to .020" a four number reduction; then to switch to the same finish gauge with a one number reduction. The difference in roll pressure is noted:

Reduction Equal Width	Gauge from To	Pressure
4#	.0319—.0201"	180,000 lbs.
1#	.0226—.0201"	115,000 lbs.
Difference		65,000 lbs.
% Decrease		36%

He would have to grind the roll to meet this decrease in pressure and to bring his sheet out flat, but he could not be given a standard amount to grind off, the standard being different for steel and cast iron rolls, for various widths and tempers of sheet. In the end while rolling, he might augment or counteract the effect of his grinding by the use of cooling water on the roll face.

Aside from the fact that roll grinding in the housings is a cut and try problem in which the roller figures largely, we must consider what a roller must do in order to roll metal to an accurate gauge.

He must:

1. Know the metal that he is about to roll as to gauge from bar to bar, temper from bar to bar, and gauge from end to end of each bar.
2. Separate his lot into sections varying in half thousandths.
3. Make sets for each of these separations.
4. Gauge both ends of all bars emerging from the first pass and again make separations in half thousandth differences and so on to finish gauge.
5. Set to the middle of the limits and not to the top or bottom side.
6. Keep bearings and metal well lubricated.
7. Adjust cooling water as needed.
8. Gauge center as well as edge of bars.
9. Keep application of metal oil as constant as possible.
10. Not roll when any mechanical defects are evident in his stand.

In some cases, the reduction per pass is taken out of the rollers hands. At such a time he should be helped by keeping the metal coming to him as accurate a gauge as he is expected to turn out.

Inasmuch as the rolling from the casting to stock gauges is the most standard rolling we have, it would be possible by scheduling widths and mixtures to control some of the variables mentioned and thus produce better gauge for the finish rollers to work on; but in the end the rollers of the rundown mills might slip by inattention to sets.

To sum up, given unlimited time and number of passes it is possible to roll to very close tolerances at present.

Hence—

Point 11. **With present classes of work and with present machinery, the roller is mainly responsible for the gauge accuracy of the sheet.**

9. **Discussion of Results.**

A review of the point procedure will reveal that the rollers ability, the heat of the rolls, the width of the metal, the reduction per pass, and the temper of the metal have the most to do with uniformity of gauge of rolled bars.

Of these the temper is fairly well under control enough so at least, that bars do not vary as to roll differently. The reduction per pass is laid down as standard practice to be adhered to, and few bars are given different reductions in the same batch; now are bars of variant widths found in production batches. Thus these items are interesting to know but probably effect the gauge of product batches but slightly.

The rollers ability and the heat of the rolls are the items toward which to direct attention.

10. **Conclusions.**

With the present class of production using the present equipment the ability of the roller is the prime factor in acquiring the desired gauge.

Hence the most important step that can be instituted for the improvement of gauge is the education and checking of rollers.

It also seems reasonable to conclude that the lubrication in a positive way of necks, etc. by standard methods would be a gain as well as greatly relieving the roller of this present responsibility.

The institution of the following system would be of value in the improvement of gauge uniformity.

1. Standard instructions to rollers regarding their procedure, duties, method of gauging, problems, and common variations in gauge.
2. Setting a tolerance for every roller to keep within regardless of the class of work he is doing.
3. Standard procedure and method of grinding.
4. Institution of a periodic check at all gauges.
5. Investigation into the possibility of scheduling some classes of work on certain rolls so that standard shapes and conditions may be attained at some places.
6. Institution of a standard and positive method of lubrication of gears, necks, bearings, and metal or decreasing the friction at necks by changing to roller bearings.

Definitions

1. **Edge to center variation:** The variation in gauge between the edge of the sheet and its center.
2. **End to end variation:** The variation in gauge between one end of a bar and the other.
3. **Batch variation:** The difference in gauge between the thinnest part of any bar in a batch and the thickest part of any bar in the batch.
4. **Greatest bar variation:** The greatest difference between the thinnest and thickest part of a single bar in a batch.
5. **Least bar variation:** The least difference between the thinnest and thickest part of a single bar in a batch.
6. **Anneal:** The heating of worked metal above its recrystallization point to soften for further work.
7. **Grain Size MM:** The average diameter of the grain of annealed metal in millimeters.
8. **Rockwell Number:** The hardness number of a method of measuring hardness by the depth of an impression on brass with a given load.
9. **Pass:** The passage of metal through rolls once for reduction.
10. **Active Pass:** The space between the rolls while they are in engagement with the piece being rolled there between.
11. **Track:** A section across the face of the roll ground to concavity for special tempers.
12. **Stones:** Blocks of emery composition used for rough grinding of roll surfaces.
13. **Stick:** A specially shaped piece of wood to grind rolls with powdered emery sprinkled thereon.
14. **"Ready" or "at ready":** Used to refer to rolling, anneal, gauge, etc. of metal just before it is given the final rolling to finish.

Nickel and Its Non-Ferrous Applications

By ROBERT C. STANLEY
President, International Nickel Company of Canada

Nickel Has Made Itself Indispensable as an Industrial Material in Many Diversified Fields*



ROBERT C. STANLEY

TO THOSE who followed world industry down to its low point in June, 1932, and who have watched its fluctuations since that time, the record of the past twelve months is an encouraging and convincing chart of improvement. The nickel industry, in supplying a demand both worldwide and industrially diversified, has directly benefitted from this general improvement. World consumption of the metal in all forms for the first ten months of 1934 was 102,780,000 pounds, as compared with 77,600,000 pounds and 49,500,000 pounds respectively, in the corresponding periods of 1933 and 1932. This continued recovery gives promise that the record of 112,481,600 pounds in the first ten months of the peak year 1929, may be attained again in due time.

In Canada and the United States the increased volume in 1934 has resulted more from the better demand stimulated in established markets by general business improvement, than from the opening up of new industrial fields for the application of nickel. Of these various markets transportation continues to be of outstanding importance, the automotive industry alone having taken some 30 per cent of the nickel consumed.

In the United States, the world's largest single consumer, the year has witnessed two other developments of potential importance to the nickel industry. The first of these is the government's campaign to stimulate home modernization. Despite the comparatively high living standards of the American people, surveys have shown that unexpectedly large percentages of homes are still without modern kitchen and plumbing facilities and without provision for continuous hot water. In these three fields monel metal, the stainless steels, the nickel-chromium alloys and the nickel silvers (all alloys distinguished for their high nickel contents) have established markets which are expanding.

Distribution of Nickel

Whereas a single year is too brief a period on which to base too much significance as to trends, it may be interesting to compare the current distribution of nickel with that for 1926. In considering these percentages it should be remembered that all nickel cannot be traced to its final destination. Nevertheless, the following comparable figures are believed to present a fairly accurate picture of the changes which have taken place in the industrial world.

	1926	Current
Alloy Steel used in Motor Cars, Trucks and Busses	36%	20%
Nickel Silver and Nickel Copper Alloys for a multitude of uses	18	18
Pure Rolled Nickel in the form of Rods, Strip, Wire, and Tubes, used largely in the Radio, in the Chemical Industries and for Coinage	10	17
Alloy Steel, inclusive of Stainless Steel, used in Railroad Equipment, Farm Implements, General Machinery and numerous miscellaneous applications	1	15
Nickel for Plating and as undercoat in Chromium Plating	5	10
Monel Metal used for many Engineering purposes and for Household Equipment	20	9
Alloy Cast Iron—castings of all kinds	1	4
Miscellaneous Uses including Magnetic Alloys, Nickel Brasses, Nickel Bronzes, Nickel Aluminum Alloys and White Gold	4	4
Heat Resistant and Electrical Alloys	5	3
	100%	100%

Thus it will be seen that, within less than a decade, the base of world consumption has been definitely broadened from the 1926 situation, when three categories of nickel applications accounted for seventy-four per cent of the total.

In studying this table it should be borne in mind that current consumption is approximately twice as great as it was in 1926. Therefore, percentage decreases during the period do not necessarily reflect actual losses in tonnage of nickel consumed; whereas percentage increases record correspondingly greater tonnage gains.

Nickel Contained in Principal Non-Ferrous Nickel Alloys

As guide to the part which nickel has in the industrial world through the alloys now being used by

*From The Nickel Industry, issued by the International Nickel Company. A very brief abstract appeared in our January issue.

industry, the nickel content of the best known non-ferrous alloys is shown in the following table:

	Per Cent Nickel
Malleable Nickel	99+
Monel Metal	67
Inconel	80
Heat Resistant Alloys (Including Ferrous)	35—85
Cupro-Nickel Alloys	15—50
Nickel Silvers	10—30
Nickel Brasses and Bronzes	½— 5

The Automotive Industry

The automotive industry continues to be the world's largest single consumer of nickel, and the increase in world production has contributed materially to the larger nickel consumption in the past year.

In common use in the automotive industry today are 28 nickel steels for which the Society of Automotive Engineers has written specifications, and there are also many nickel cast irons and non-ferrous alloys, and an appreciable quantity of nickel plated parts.

One of the developments of the year has been "bright nickel plating," which requires no buffing or polishing, and opens a larger field for nickel plate on many automotive parts which are difficult to polish. There also was a more general use of a heavier coating of nickel.

The Railroads

With the present trend in railroading toward greater speeds and lighter weights, the designs and specifications of motive power and rolling stock are undergoing changes which are stimulating the use of nickel alloys.

The adoption of Diesel engines as the power unit of high-speed trains both here and abroad, brings to the fore the increasing use of nickel steels and nickel cast irons in the construction of these engines. A series of recommendations recently issued in England for Diesel engine materials listed specifications for 6 nickel-aluminum alloys, 2 nickel-copper alloys and one nickel-chromium alloy which contains 65% nickel.

The Marine Field

In marine construction nickel alloys became more firmly entrenched as shipbuilding materials during the past twelve months.

Growing recognition of cupro-nickel tubing for condenser service has stimulated increased production facilities and has accounted for a large additional tonnage in installations both here and abroad.

For primary power of all large ships the choice lies nowadays between Diesel engines and steam turbines, whether the drive is geared or electric. Steam turbine blading is made of either monel metal or stainless steel and is laced with pure nickel wire. Monel metal is being adopted for boiler feed storage tanks, and various nickel alloys are used in the auxiliary machinery in the engine rooms.

In the field of such smaller craft as Coast Guard patrol boats, lighthouse tenders, yachts and speedboats, the use of monel metal for propeller shafting increased substantially during 1934. Of special interest in this respect is the expanding use of monel metal in the fishing fleets, for hold linings as well as for shafts.

Aviation

In aviation as in railroading, the trend is toward lighter, more efficient equipment, involving changes in both plane and engine design, which broaden the field for nickel alloys.

Although the use of monel metal for the pontoons of seaplanes is by no means new, a novel application of this type has been made by the Canadian Government, who have equipped their planes with monel metal skis for winter service in the ice and snow.

The Heavy Industries

Whereas the durable goods industries of the United States continued to lag through most of the year, nickel further established itself in uses which should prove important markets as those industries become more active.

The Non-Ferrous Foundries

The development of special alloys, which was first evident in the steel industry and then in cast iron, was extended during 1934 to the field of casting brasses and bronzes. The results have already been noteworthy. While formerly nickel went into this industry only in the form of 50-50 cupro-nickel scrap at the rate of approximately 1,000,000 pounds of nickel a year, virgin nickel is also being consumed now in increasing volume.

Contributing to this development has been the improvement made in the casting properties of nickel-silvers, especially with regard to producing tight castings and to insuring color uniformity. Another factor has been the growing recognition of nickel as an economical ingredient in bronze foundry mixtures.

In investigating the nickel bronzes, it has been found that a number of these alloys can be hardened by heat treatment in a manner similar to that of Duralumin. By such heat treatment castings of these relatively inexpensive alloys develop tensile strengths above 100,000 pounds per square inch, with proportional limits above 60,000 pounds.

The demand for monel metal pump parts has led to increased production of monel castings and to the development of a silicon-alloyed monel metal. This material, which is very hard, has shown excellent service in steam nozzles and other parts where hardness and freedom from galling are desirable.

Oil

In the oil industry, the increasing depths to which drilling is being carried, the introduction of new refining processes, and the trend toward more economical distribution have all opened new markets for nickel alloys.

Monel metal has won recognition in production equipment for handling and cleaning the drill mud.

Many other nickel alloys of all kinds have been introduced in oil refineries in the course of the last year. Among the outstanding ones are nickel-aluminum-bronze condenser tubes and Ni-Resist bubble caps for fractioning towers.

Public Works Projects

The city, state and federal governments of the United States, in attempting to solve their unemployment and work-relief problems have developed pro-

jects on such a scale as to be reflected in world nickel consumption.

Monel metal has become established for use in the filtration of conditioned sewage sludge.

At Boulder Dam, monel metal was selected for the grout stops which serve as expansion joints and seals between the blocks of concrete which form the masonry of the dam. Monel metal was selected also for the valve seats of the four huge water gates that will control the flow of water for power and irrigation purposes. These great forgings have an aggregate weight of 112,240 pounds, and an additional 15,000 pounds of monel metal have gone into screws and bolts to fasten the seats in place.

The Textile Industries

In this field the three most important markets for nickel are in the manufacture of rayon, the bleaching and dyeing of all textiles and their laundering or dry cleaning when soiled.

Rayon manufacturers have broadened their use of nickel to include filters, water softener piping, ripening tanks and homogenizer tanks, the last two being made of nickel clad steel.

There has also been an increase in the use of nickel tubes for evaporators for recovering rayon hardening baths. Nickel is being introduced as coils in the steam chests of lead-lined evaporators where the construction of a complete evaporator from nickel is not wanted. The use of monel metal for dye vats continues to expand.

The development of a combination dry cleaner, washing machine and extractor of intermediate size to meet the requirements of small tailor shops has opened a new market for monel metal.

The Food Industries

Perhaps the most complete coverage by nickel of any industrial field is in that in the group of industries preparing, handling and serving foods and drinks. Monel metal, stainless steel, pure nickel and Inconel have become accepted standards for one or another of a long list of uses which include fishing and oyster boats, dairies, transportation of loose milk, canneries, packing houses, restaurant and hospital kitchens, cafeterias and soda fountains, breweries, wineries, distilleries and bars.

There is a definite trend towards using Inconel for bottling equipment, for which nickel silver has also come into favor. At the same time the use of monel metal for bars and back-bar equipment fittings continued to expand.

The growing popularity of tomato and fruit juices has created a new market for monel metal in the super centrifuges used.

The Household Field

The stimulus given to home modernization in the United States by the Federal Housing Administration has been an important factor in developing this market for nickel, and is expected to be even more important in 1935. For the past several years the nickel industry has been a pioneer in advocating the planned kitchen which emphasizes not only efficient arrangement of the various kitchen utilities but also the provision of bright metal working surfaces which cannot chip or crack and which are easy to clean and to keep clean.

Indicative of the interest shown in the planned kitchen is the content sponsored by Architectural Forum, in which architects and designers were invited to enter plans. Out of 258 entries, 238 specified monel metal for kitchen equipment. All of the six prize winners and those given honorable mention included monel metal sinks in their designs. Monel metal, as the outstanding factor in this development, is benefitting materially.

Of major importance in the household field was the growth in sales of Whitehead hot water heaters which were first introduced in 1933. Whether for coal, oil, gas or electric heating elements, these heaters all feature a monel metal storage tank.

Broadening the market for metal in furniture, which was started in terms of bright metal, was the sponsorship given by several of the leading American designers to black nickel plate and to a golden nickel-silver alloy.

Coinage

Appreciation of pure nickel for coinage continued with one more country being added to the list of those adopting this metal for currency and with three additional denominations being minted. With the return of business activity there have been substantial purchases of nickel for use in subsidiary cupro-nickel coinage, especially in the United States.

Jewelry

The use of nickel and nickel alloys for jewelry and ornaments was extended considerably during 1934, due largely to the increasing appreciation of the white metals for costume jewelry. For belt buckles, rings, tie-clips and other articles for men's wear, monel metal retained its popularity.

Pure nickel is also going into jewelry in increased amounts, especially as a base for rolled gold plate in eye-glass frames and other forms of jewelry where stiffness is desirable.

Radio

Pure nickel continues to be used extensively in vacuum tube manufacture, both in tubes for radio service and in those designed for the many other applications which have been developed.

Nickel Plating

Three factors contributed materially to the important increase in consumption of nickel plating. The first has been the more general adoption of a heavier deposit than had been customary. The second was the expansion of the "bright finish" method of electro-plating, which eliminates the need for buffing. The third was the increasing popularity of the nickel-plated finish in the Old World markets.

Correction in Platers' Guidebook

Our attention has been drawn by Baker & Company, Inc., of Newark, N. J., to an error on Page 27 of the 1935 Solutions Edition of Platers' Guidebook. In our article on Rhodium Plating, the statement is made that patents on rhodium plating solutions are held by Baker & Company, Sigmund Cohn and Mark Weisberg. The fact is that Baker & Company, Inc., of Newark, N. J., are the sole patentees for this process. Other manufacturers operate under license from Baker & Company. We hasten to correct this misstatement.

Electrolytic Cleaning and Pickling

By WALTER R. MEYER

Electro-Chemist, General Electric Company, Bridgeport, Conn.

The Electric Current Has Been Used Extensively in Cleaning and Pickling and Many Cases of Misuse Have Come Under the Writer's Observation. Peeling, Brittleness, and Over-Etching Often Result from Improper Use of the Current*

THE values of the use of electricity are several:—

1. The mechanical scrubbing action of the hydrogen liberated at the cathode. 100 amperes for one minute will liberate over 600 cc of gaseous hydrogen. The scrubbing action is great because of the fine state of discharge of the gas and the closeness of its discharge to the cathode surface. This is of the order of inter-atomic dimensions. Because of these factors this volume of cathodically discharged hydrogen has a more effective cleaning action than would result from impinging an equal amount of gas upon the cathode from an external source; for example, air agitation. The rate of discharge over various parts of the surface will be a function of conductivity and hydrogen over-voltage at the particular point concerned. If a metal with high hydrogen over-voltage (such as tin or lead) is deposited in the cleaning or pickling solution better "throwing power" of cleaning will be obtained. This principle is used in the Bullard-Dunn Descaling Process.[1]

2. The reducing action of hydrogen is very great, being greater in acid than in alkaline media. Its power of reduction is far greater than ordinary gaseous hydrogen because it is available for reduction in the atomic state. The powerful reducing action of atomic hydrogen has been studied by Kahlenberg and Huntzicker[2] who found that it reduced sulfate to sulfide, phosphate to phosphide and was capable of displacing nickel from solution. Potential readings as high as 780 millivolts in N $NiSO_4$ solution were obtained with nickel cathodes that had been subjected to cathodic discharge of hydrogen. This is surprising in view of the fact that nickel is rated as being .23 volts more negative than the normal hydrogen electrode.

3. When the work is made the anode, carbonaceous material may be oxidized or swept away.

4. By anodic etching, brittle buffed "skins" may be removed giving a stronger basis metal surface for plating. Anodic etching will occur in alkaline or acid solutions if the metal or its oxide, is soluble in the solution used. A depassifying agent may also induce anodic etching. The action of chlorides in causing anodic solution of nickel is well known. The late "Dad" Liscomb[3] has pointed out this action in the effect of chlorides in alkaline cleaning solutions on the corrosion of iron tanks or anodes.

*Presented at the October Meeting of the Bridgeport Branch of the Electro-Platers' Society. From the Monthly Review, November, 1934.

1—The Bullard-Dunn Metal Descaling Process—Colin Fink and T. H. Wilber—Trans. Electro-chemical Society preprint 66-24.

2—H. Huntzicker and L. Kahlenberg—Trans. Amer. Electro-chemical Society, Vol. 63, page 349.

3—E. J. Liscomb—Monthly Review—Jan. 1931, page 17.

4—Der Einfluss des Kathodischen Wasserstoffs auf die Festigkeit des Stahls—Stahls—D. Alexejew, P. Afannassjew, W. Ostroumow-Zeitschrift für Elektro-chemie, Vol. 40, No. 2, page 92.

5—B. H. Thomas—Proc. Inst. Auto Eng. 1920—601.

6—J. P. McClare—Trans. Faraday Soc. 1924 20-87.

Choice of Acid

Let us take the case of electrolytic pickling. Which is better anodic or cathodic treatment and what acid is better, sulfuric or hydrochloric acid? An answer is difficult to give as it depends upon the material and effect desired. As a general observation, hydrochloric acid (muriatic) is better for general acid dipping as it is more effective in removing passifying oxide films and because the reaction products are more soluble than those of sulfuric acid. If pronounced etching is required, make the work the anode in hydrochloric acid. This holds for steel, lead alloys and copper alloys. In case of nickel basis metal, muriatic acid is much superior to sulfuric, when anodic pickling is employed.

If a light etch or a more easily controlled etch is desired, use a sulfuric acid solution. This is not recommended for nickel or lead basis metals. In the case of lead, either lead oxide or basic lead sulfate forms which is difficult to remove and may lead to non-adherence of the plated coating. In pickling of steel anodically in sulfuric acid solutions, chlorides present as impurities will sometimes cause accelerated pitting. An important consideration is that most metals tend to form passive films when anodically cleaned in sulfuric acid and sufficient time should be allowed for the acid to dissolve the passive film before removal of the work from the dip. A subsequent muriatic acid dip is very effective. Such passive films are excellently illustrated by the anodic treatment of aluminum.

Anodic etching at high current densities[5,6] in sulfuric acid has been used for iron when high adhesion is desired. Acid concentration is 4-7N, current density 150 amp./sq. ft. After a short period of operation, passivity sets in and the evolution of oxygen sweeps away the loose insoluble carbonaceous material.

If cathode pickling is used, muriatic acid is preferred. In this process the effective action of atomic hydrogen is available for reduction of oxide films. Plating on stainless steel is made possible by this type of pickling. It has several disadvantages. Firstly, hydrogen embrittlement in case of steel. This has been recently studied by D. Alexejew[5] and his co-workers in Leningrad, who report that traces of impurities cause rapid embrittlement due to catalytic action. Mercury, arsenic and sulfur compounds were the chief offenders. The embrittlement action increases with impurity concentration, current, time

and straining of steel. The acid concentration has little influence.

A second disadvantage in the use of cathodic pickling, is the plating action resulting from solution of the metal to be pickled. This is evident as a grey film on the work. It is structurally weak and may lead to peeling of subsequent deposits. This is especially true when the surface is smooth, and nickel and chrome plating follow. This condition should be watched and the solution discarded upon its appearance. Insoluble anodes as carbon should be used.

A third disadvantage is the formation of loose metallic deposits due to the reduction of oxide coatings already present on the work.

Electrolytic cyanide dips are sometimes used. In this use, the dangers present in anodic or cathodic pickling are also present. Anodic cyanide etching has been recommended for copper and brass to remove the thin, brittle, highly-worked skin present after buffing.

Electrolytic Cleaning

From a grease removal standpoint, cathodic electrocleaning is twice as efficient as anodic inasmuch as twice as much hydrogen (by volume) is liberated than oxygen. Metals which are soluble or whose oxides are soluble in caustic soda, should best be cleaned cathodically. Pronounced etching will result on anodic cleaning of lead or zinc.

The two chief difficulties in cathodic cleaning are hydrogen embrittlement and plating out of impurities. Alkaline cleaners containing caustic soda, or trisodium phosphate have been found to plate out lead, tin, copper, iron and zinc. A reversal of current with a cathode with the above impurities upon it will not result in the plating off of all these metals. Tin, zinc, and part of lead will be plated off, but iron and copper will be oxidized to their respective oxides. I would like to emphasize this point as it is commonly believed that reversal of current will plate off the smut formed when direct current cleaning is employed. Reversal of current has its value in that the copper and iron are more readily removed in the subsequent acid dip. In cases of lead alloys a hot caustic dip (4 oz./gal.) is effective in brightening the lead surface by solution of the oxide to form sodium plumbite.

A trouble sometimes encountered in cathodic cleaning is the deposition of colloids resulting in pitted or non-adherent deposits.[7]

Anodic cleaning removes the danger of plated smuts but is less efficient. Care should be taken in the following acid dip to remove any passive films. Anodic cleaning is not recommended for lead, tin, zinc or copper alloys if a bright finish is to be maintained. It is not recommended for cleaning nickel prior to chrome plating, due to propensity toward nickel oxide formation.

Electrolytic cleaning of nickel deposits as a cathode previous to chrome plating may have an influence on the peeling tendency of the nickel-chrome deposit. According to Max Schloetter[8], peeling of nickel deposits after chrome plating results from the pressure of hydrogen between the base metal and the nickel deposit after saturation of the base metal and the deposit with hydrogen. The hydrogen absorbed in electrolytic cleaning of the nickel would, consequently, increase the likelihood of peeling.

In view of the plating action in cleaners, it is better practice to perform the reverse cleaning in a separate tank. Chlorides should be kept out of the solutions and separate set-ups for soft metals as zinc and lead be used whenever possible. Provided grease removal is complete a non-electric cleaner will leave the work in a condition to obtain the best possible adhesion of the electro-deposit.

It is hoped that this picture of the dangers and advantages attendant with the use of electro-cleaners and acid dips will lead to their better understanding and utilization.

7—G. Hogaboom—Monthly Review—Jan. 1932, page 30.
8—Communication from Max Schlötter.

Furnace Linings

Q.—I am looking for a lining for a melting furnace to be used on silver chloride. This silver chloride contains free nitric and hydochloric acids.

Previous attempts in crucibles and ordinary fire brick linings have resulted in the complete destruction of such crucibles, etc., by the action of the acids and the soda ash fluxes.

Would you recommend a chrome or magnesite brick?

A.—In the first place, I think they should thoroughly mix their silver chloride with sufficient soda ash to make a dry mixture. That would neutralize the free HNO_3 and HCl and on heating thoroughly decompose the silver chloride.

I don't think the free HNO_3 and HCl really have any effect on the crucibles or lining because they have probably been volatilized before the temperature gets to the point where the bricks could be affected, but by neutralizing the acids and having a dry mixture you cut down the smelting time.

Before going to chrome or magnesite brick, which would undoubtedly be more serviceable than fire brick, but more expensive, I would try cementing the fire brick with chrome cement. The joints should be thoroughly cemented with this material which is prepared by thoroughly mixing the dry chrome cement powder with water-glass to a consistency like any other cement. After the brick lining has been all put in, it should then be all plastered over well with the chrome cement. It should be allowed three days for air-drying and after that, dried thoroughly with a low fire. —E. J. F.

Dark Nickel

Q.—We are sending you a sample of a nickel solution which plates dark. What is the trouble?

A.—Analysis of nickel solution:

Metallic nickel	2.07 ozs.
Chlorides	3.19 ozs.
pH	5.2

The metal content is quite low and the pH entirely so. The low pH is the cause of your trouble. Would suggest that you add to each gallon of solution that the tank contains 4 ozs. of single nickel salts and 6 cubic centimeters of 26° ammonia.—**O. J. Sizelove.**

Reminiscences of a Plater's Kid

By RALPH W. TILLOTSON

Electro Plater, Erie, Pa.

With a Toast for the Old Days and Some Headaches of More Recent Days in Another Installment—Part I

AS A shop "kid" and plater's helper, back in the "good old days," I received the impression that all platers were "shooters of the bunk." This impression originated in the question and answer period of my youth. Since all kids ask questions, the first problem for which I can remember seeking an answer for, was the purpose of the mysterious "wires, riggin's, solutions and green crusted tanks." In reply to my confused question, the plater solemnly shifting his cheekful of chewing tobacco around to the other side, gave me to understand that "them there tanks is batteries," and were for generating electricity which in turn ran the shop. As a kid I had "monkeyed" with wet batteries like the bichromate potash type, and these tanks with their wires, poles, and anodes hanging in them reminded me somewhat of big overgrown batteries, so that for a day or so I half accepted the plater's jest. What broke the tale down was my coming upon the engine room, so that afterwards I was suspicious of what the older men told me about plating equipment.

That particular plant has long since passed out of the picture with the death of its owner in 1908. But there are many living craftsmen over the country, and retired supply salesmen, who will remember the old Erie Nickel Works and its proprietor Fred E. Mertens, who took over the business in 1885. The original beginnings as a plating plant are difficult to establish, as for years before 1885 it was operated as a plating plant by one McArthur. A veteran merchant of the neighborhood informs me that in 1872 the building was an old lumber mill, so that it is probable it became a plating plant around 1875. Ample evidence of ripe old age can be recalled by the writer in the antiquated lathes and machinery used there as late as 1908.

"How Things Were Done in Them Days"

Many of the impressions of "how things were done in them days" remain indelibly impressed upon the memories of the writer. All kids and helpers were in for a great deal of kidding and practical joking among the rough and tumble element which composed the polishing, buffing and plating forces of plating plants. To carry home, all unawares, in one's pocket, a chunk of polisher's tallow alive with maggots and exhaling a stench far worse than decayed limburger was no unusual experience. It must have been about the year 1899 or 1900 when our first experiences began, during the summer school vacations. From then on the whole scale of experiences was rapidly climbed. By the time of the St. Louis World's Fair, in 1904, when the "line" of polishers and buffers were "rooting" on stove castings and singing what was popular then, "Meet Me At St. Louis, Louie, Meet At The Fair," we had seen experience as "boss of the pickle tank," "scratch brusher," "scrubber" and what not. By 1908 additional experiences had been accumulated in the way of oiler, boiler fireman, wrapper, and collector of long overdue accounts for "nickeling bicycle parts, stove parts, and people's knives and forks." And, oh yes; "wirin' an' unwirin'" the work. Such modern innovations as hooks and racks were undreamt of, and all work was "wired up," and "unwired." This later operation brought forth many a rueful or profane remark upon examination of ones thumb and forefinger, the hard, crinkled and burned wires being tough on the fingers. Orders in unwiring were to lay the wires in neat bundles, and when they had accumulated in a bundle the size of one's forearm, they were whipped and belabored over a heavy sheet of boiler iron to make them straight and soft again. We used these wires over and over, the work often dropping into the tanks from broken brittle wires. This meant "fishing it out" with a long handled hoe. Clumsy handling of the hoe resulted in "stirrin' up the mud," for which one got Hell all around. The "mud" of course caused a rough sandpaper-like deposit and howls of wrath from the buffers who could not bring this "sand paper finish" to a high color.

Blowers we had none, and most of the work was cast iron stove parts, so that the clouds of dust can well be imagined when in the heyday of coal heater and steel range production, the old shop carried on its payroll from fifteen to twenty-four polishers. The later number of "shiners" were employed about 1902 before the "writer's days," when a local stove concern easily recalled by many old timers as the Chicago & Erie Stove Works pushed a large production of heaters and ranges. Another old popular make of heater getting an occasional amount of plating service at the Erie Nickel, was the well known Black & Germer, of Erie. Other lesser sized production came from such plants as American Beauty Stove Works, and not to forget to mention, the South Erie Iron Works, makers of heaters and ranges. The names of such business houses will be recalled by many retired salesmen as being now only a memory, their days of rush orders and night work pushed out of the picture by modern gas heaters, furnaces, etc. And much of the nickel plating of stove trimming have gone over to the porcelain enamel business.

The Old Time Polishers

My recollections of the old time polishers are of hard working, sweating, drinking and cursing men. Three bucks a day was a good day's pay. And as for drinking, who ever could blame them! Where blowers were unknown, polishers of iron had their underwear turn red in summer, and brass men were often green to the skin. I take oath however, that in those days the beer so often brought into the shop by the rear alleyway, tasted ever so much better, along with a fat salty pretzel, than it does today. And that first plater whom I "learned under," could outdo any modern plater in scrubbing load after load of work. He could keep it up all day, using sifted molder's sand to scrub with, and "hangin' in, and pullin' out" in between. Along with blowers, electro-cleaners were luxuries of course, there being only the old "lye kittle," boiling hot. When, finally, during the last months of the old shop's existence an electro-cleaner was set up, with a cleaner sold by Hanson-Van Winkle at that time, the son-of-a-gun of a plater couldn't get used to it, and drifted back to the scrubbing brush and molder's sand again. I still carry a tender spot in my heart for that plater who wore wooden shoes while at work, and when so disposed would dance a clattering jig on the wooden floor, giving the sound of so many popping machine guns. This often happened on a hot summer day after a drink from a foamy growler of beer. "The Old Days," Alas! I can still drink a hearty toast to those old days, and to the buffers who "horsed" on stove panels all day with red crocus, going home at night looking for all the world like red Indians.

The Old Time Generators

Our great-grandfather platers who pioneered and had no "electrical dynamo machines" as yet, but used great series of wet batteries, had little reason to envy us, at the old shop. We had two generators, made in the dim and misty past by Hanson-Van Winkle. They were built round, like a small barrel, and had hollow cast fields, through which water could be circulated with hose connections going from one field to the other; this to prevent them from burning up under a heavy load! It is too bad they were not saved for the local museum as a relic of what platers once had to contend with! When these venerable "electrical machines" were in operation they would set up a mournful howl, or as the load got heavy, a savage scream! Long blue sparks flew from the brass two piece commutators, and for brushes there were cut sheets of copper held together several layers thick; also helpful to noise-making aplenty. Many a time these old generators played a dirty trick. The tanks being full of work, and customers "hollerin' fer th' work," the generators now and then took on a streak of orneryness and kerplunk, they "reversed"! The flow of current being reversed, the work in the tanks became anode, and in less time than you could tell about it, the whole mess would be pitted and eaten full of holes by the reverse current. This always called for much ill-tempered profanity, repolishing of the work, and shifting the generator brushes around until the polarity was again corrected.

The Old Time Solution Control

And there were other tragedies, such as tanks that now and then sprung leaks in the night and greeted the plater half full next morning; or sometimes the creaking wheel washer "went on the bum." Then for a few days wooden wheels lay in shady corners of the shop yard soaking in mud baths to soften the old glue and emery.

Best of all were some of the holidays! Many the Decoration or Thanksgiving Day spent "cleanin' out the boiler," or shoveling yellow mud out of the nickel tank bottoms. Those old flat cast anodes seemed to turn into yellow mud in no time, and sometimes being recast at a local foundry, they would shortly after fall apart and into the tank bottom. When mud was shoveled out, it generally meant that leaks developed, which called for pieces of waste rammed into the seams. Solution control went on by Rule of Thumb. There was the acid pitcher standing on the shelf with the ammonia bottle by its side, and the inevitable litmus paper, the use of which was as good as guesswork. When one of the solutions "went on the bum," recourse was had first of all, to a delicious round of profanity, removal of chewing tobacco from the plater's cheek, and violent hurling of same against the wall, where it usually stuck for the time being. If she was "peelin an' raisin' th' plate," then the acid pitcher was used, a fresh tank full scrubbed up and tried out. Sometimes there occurred a battle of wits and guesswork with those solutions which got streaks of cussedness just like the old generators. If she "burned th' ends," or didn't "throw in the middle," then it was juggle with the ammonia bottle, or add more salts quickly boiled up in a wooden tub. The use of the litmus paper as often got us in wrong as it helped us. One of the "platin' secrets" to mystify me as a kid was the bringing forth from its place of hiding in the office closet among a litter of bottles, jugs, chemicals, and wet battery parts, the Baume hydrometer. The glass test tube being filled with solution it was solemnly thrust in, and as solemnly squinted at; the object being, as it seemed to me, to impress others with an idea of the tremendous wisdom of the plating fraternity.

The Old Shop and its Boss

To this day, when survivors of the old shop meet, they fall to recalling incidents, nodding their heads in agreement, "that there never was a joint like it in the whole country." But for the writer who was just one of "th' shop kids," the thought still persists that there never were such good old days, nor such a good-hearted uncle for a boss, even if the writer "got bawled out" time and again for much less important things than now and then forgetting about the fire under the boiler and having a gang of polishers and buffers purposely stall an engine struggling under a dying head of steam. We smack our lips in remembrance of the cans of cold beer on hot sweaty summer days, when the hard boiled polishers "roughed, fined, greased an' colored" to the squealing of hard pressed leather belts. Butchers' tallow was slopped on the grease wheels, flying on floor and wall; rotten bricks were hunted for and in great favor for cleaning off wheels before setting up again, and the clouds of red brick dust that now and then arose between the dust of "roughing and fining," it seemed to me as a kid were often raised out of pure deviltry to see who could make the most dust. Tallow was often hard to get in the neighborhood because of the nearness of the large Black & Germer

plant with its host of "shiners." This plant, formerly very active is a thing of memory and cobwebs today. The home of yesteryear's famous Radiant Home Stoves and Ranges is all but silent and deserted; floor after floor once stocked to the ceilings with finished stoves and ranges against the rush season, echo no longer to the busy clatter of hundreds of workmen.

The polishing and plating department is empty but for old lathes and tanks, dreaming of other days. Gathered to his forefathers is Captain Wicks, who often "fired an' re-hired" men and kids, all in the course of a busy day, and presided over the plating and polishing management of the Germer establishment. The writer remembers Boss Wicks' "special secret" job, that of flashing copper plated Radiant Stove top urns, in a gold wash. Needless to say, no amateurs were allowed to "monkey" with this job, at least not until later days, when the Captain had forsaken the plating business entirely for the lake front where he owned a quite palatial cabin cruiser. The story goes that this craft was built in an unused part of the Germer plant, all by polishers and molders. Being hauled to the waterfront for launching, the question of naming it came up. "Damned if I know," said the first man asked, and so said the second and third. So the craft was named the "Dam-'f-I-Know," and for years was a familiar sight about the harbor. The old Chicago & Erie Stove plant still stands also, but now adapted to other uses. Incidentally, the Frederick B. Stevens Company, platers and foundry supplies, has its Erie office and warehouse in the old four story brick pattern house of the Chicago & Erie Stove plant.

Old Time Plating Literature

Perhaps the most prized relic of old days in the plating game that the writer possesses is an old volume, which has a special place of honor among the books of his library. This is a heavy work by Wahl, entitled "Galvanoplastic Manipulations," copyright 1883, then published by Baird & Company of Philadelphia. It is listed in the index at $7.50 but it would take many times that sum to get it from the writer. Many are the quaint and curious "manipulations," described therein, and illustrations of odd equipment used more than half a century ago. This old work is from my uncle's collection, given me when he died in 1908.

Let me conclude by quoting a formula for a nickel solution of "them days." It is listed as "No. 6 of Powell's solution." Wahl goes on to say of it, "These solutions yield good results, but their complex composition must debar them from general use."

Formula according to Powell, about 1877:

Water	400 Parts
Phosphate Of Nickel	10 Parts
Citrate Of Nickel	6 Parts
Pyrophosphate Of Sodium	10 Parts
Bisulphite Of Sodium	1½ Parts
Citric Acid	3 Parts
Aqua Ammonia	15 Parts

No wonder such a solution was "debarred from general use" even half a century ago!

These Reminiscences will be continued in an early issue.—Ed.

Recovering Gold

Q.—I have been a subscriber to your **Metal Industry** for the past few years, and would like a little help from you now. I am gold plating small toilet articles and would like to know how to recover the gold. I understand the latest method is by using aluminum instead of zinc. Then also I have racks that are coated with gold; would you use a file to file it off, or is there any other way instead of reversing the current? Your help will be greatly appreciated.

A.—The usual way to recover gold from old cyanide solutions is to add zinc shavings or coarsely granulated zinc, let it stand for several days, and stir as often as convenient. The zinc throws down the metallic gold in the form of a dark brown powder, and itself goes into solution. The liquid is poured off and thrown away as soon as the owner is sure that all the gold has been deposited out. The powdered gold is always impure; it should be collected, washed, dried, and usually is then melted into a button. In most cases the button is not pure enough to be used in making up new solutions, but must be either sold or refined.

Aluminum shavings or thin strips can be used instead of zinc; the action is practically the same except that aluminum works faster and sometimes (especially in refining acid solutions) it makes the liquid hot enough to boil over. Both methods are used.

Removing gold from the old racks is usually done by reversing the current, as you say. When the racks get very old, or are ready to be discarded, they usually are melted up and sold. If you are equipped to refine them by acid methods, it might pay to dissolve the gold off with aqua regia, as far as possible, first cutting them up into convenient pieces. It would be slow work to file the gold off, though of course it could be done. If you try this, remember that the metal removed will contain more or less steel from the file; this should be removed if possible before melting up the gold particles.

Jewelry Metallurgist.

Melting Furnaces for Tube Metal

Q.—In melting metal for tube works—seamless brass drawn tubes and copper tubes, do you know why for instance, a No. 275 tilting crucible furnace operating with oil would not operate successfully for the melting of metal? Or a No. 125 or No. 150? From your experience what is the general practice throughout the United States outside of the old style coke pit furnace or electric furnaces?

A.—It is true that most of the copper melted for tube work is melted in the old style pit furnace or the electric furnace. There is no reason why an oil-fired crucible furnace would not be just as good as the coke or coal fired furnace. There may be some objection to the tilting style crucible furnace due to having to transfer the metal to another crucible for pouring. However, that should not interfere with the quality of castings provided the proper crucible or ladle is used. In fact, we believe it would be cheaper and more efficient to use the tilting type crucible furnace if the necessary pouring equipment is provided for.

—W. J. Reardon.

Sprayed Metal for Protection

By F. A. WESTBROOK
Mechanical Engineer, New Canaan, Conn.

A RECENT development in the field of protective coatings on non-ferrous metals over iron and steel products is rapidly coming to the fore and deserves careful consideration from many branches of the industry. This development consists of spraying a protective non-ferrous metal in a molten condition on the properly prepared iron or steel surface, either before or after fabrication of the parts. The primary purpose of such coatings is,

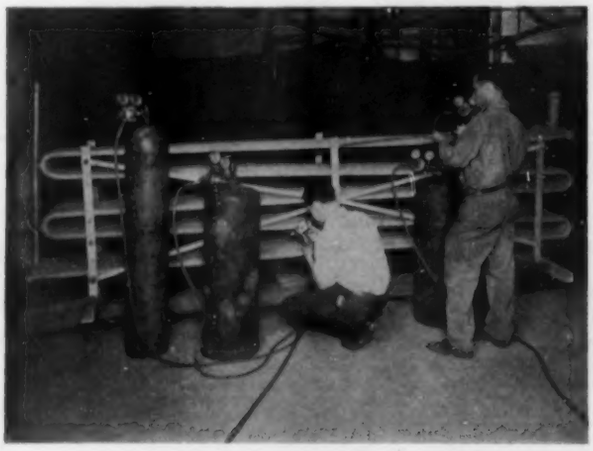


Fig. 1. Zig-Zag Cooler Coated with Stainless Steel

of course, to prevent corrosion, but heat resistant coatings, decorative coatings and coatings to replace worn machined parts are just as practical.

The process of applying these coatings consists of first sand blasting the surface to be coated and then using a portable spray gun to cover the surface with the protective layer. The metal to be sprayed is fed into the gun in the form of a wire by means of a feed mechanism and is melted by means of an oxy-acetylene flame. A jet of compressed air atomizes the molten metal and sprays it.

The rate at which metal may be sprayed in this way varies according to the melting point. Taking a thickness of coating of 0.006", the surface which can be covered in an hour ranges from 6 sq. ft. for iron to 61 sq. ft. for lead. The oxygen and acetylene pressure range from 13 to 15 lbs. and of the compressed air from 45 to 55 lbs. The consumption of gases is from something like 15 to 25 cu. ft. of acetylene, 16 to 30 cu. ft. of oxygen and 2500 to 3500 cu. ft. of air per hour.



Fig. 2. Test Piece Showing Metal Coat is Better than Paint

The metals used for the coating include zinc cadmium, aluminum, lead, tin, copper, brass, bronze, German (nickel) silver, Monel metal and nickel. There are cases where a coating of one non-ferrous metal is used to protect another such as covering a copper tomato cooking kettle with tin.

Figure 1 shows a zig-zag cooler being metal coated with Enduro KA2. The thickness of the coating is .006 inches and the steel pipe of which the cooler is made is 1 inch in diameter, and 12 feet, 2 inches long. The cooler is 3 feet high and 17 inches wide. The spray apparatus used by one of the men has been provided with an extension nozzle so that he can reach in between the tubes. The time used to do this job was 7½ hours for the sand blasting and 36½ hours for coating. The amount of metal used was 24 lbs., 4 oz.

The superiority of non-ferrous metal coatings to paint for the protection of steelwork can be well illustrated by a few examples. The first of these is a test made recently, or recently concluded, on a steel plate 34 by 24 inches in size. The top half of the plate, (see Fig. 2) was metal coated, after sand blasting, first with aluminum to a thickness of .004 ins. and then with a similar thickness of zinc. This was done on both sides of the upper half of the plate. The bottom half of the plate was given a coat of red

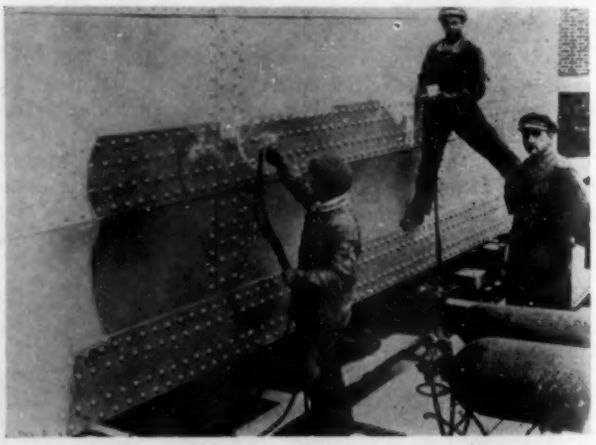


Fig. 3. Metal Coating a Canal Dock Gate

lead with two coats of paint over it. This plate was then hung up for 46 months where it was exposed to the fumes from the ventilator of a locomotive round house. Fig. 2 shows very plainly how the lower half of which was protected only by paint became badly pitted, whereas the upper half, protected by the sprayed metal coating, has not suffered at all.

The sand blasting and metal coating equipment is frequently placed on a motor truck for easy transportation to the work. This is one of the great advantages of this method of applying protective coatings to structural work. For instance, Fig. 3 shows such work in progress on a dock gate for the St. Denis Canal in France.

Fabricated Metal Products Display

THE photographs reproduced on the accompanying pages feature an exhibit of the products of The American Brass Company located on the 19th floor of 25 Broadway, New York, N. Y. It is open to public inspection at any time during business hours.

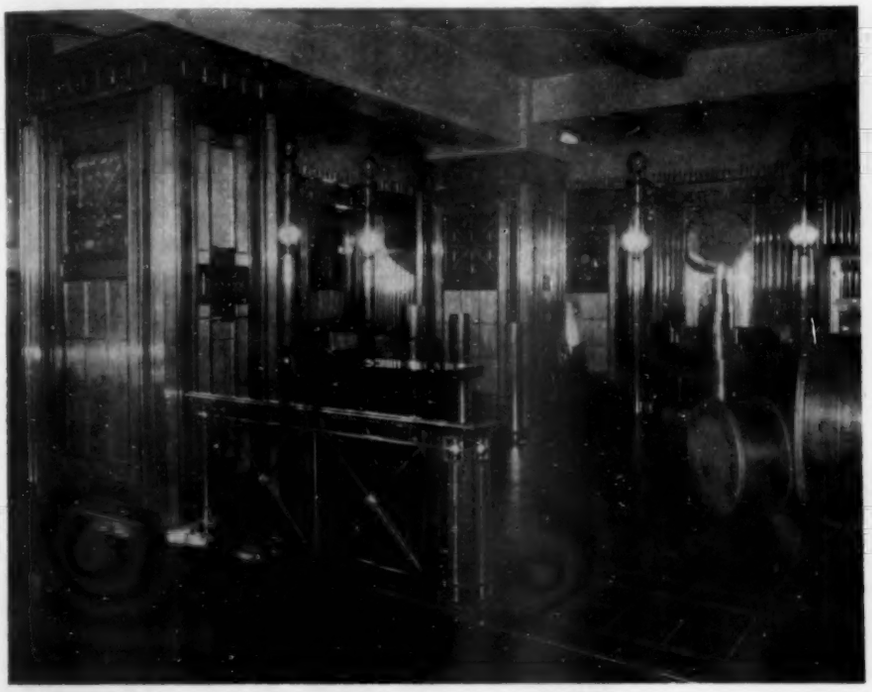
To those interested in the metal business the display offers a splendid opportunity to study not only copper and its various alloys but how and for what they may be used.

One of the special alloys is Everdur, an alloy of copper, silicon and manganese. Castings, wire, rod, bolts, conduit and other Everdur products are on display. Various other products of Copper, brass, bronze and nickel silver are to be seen along with Anaconda Beryllium-Copper, Tempaloy, Avialite and other new and modern products.

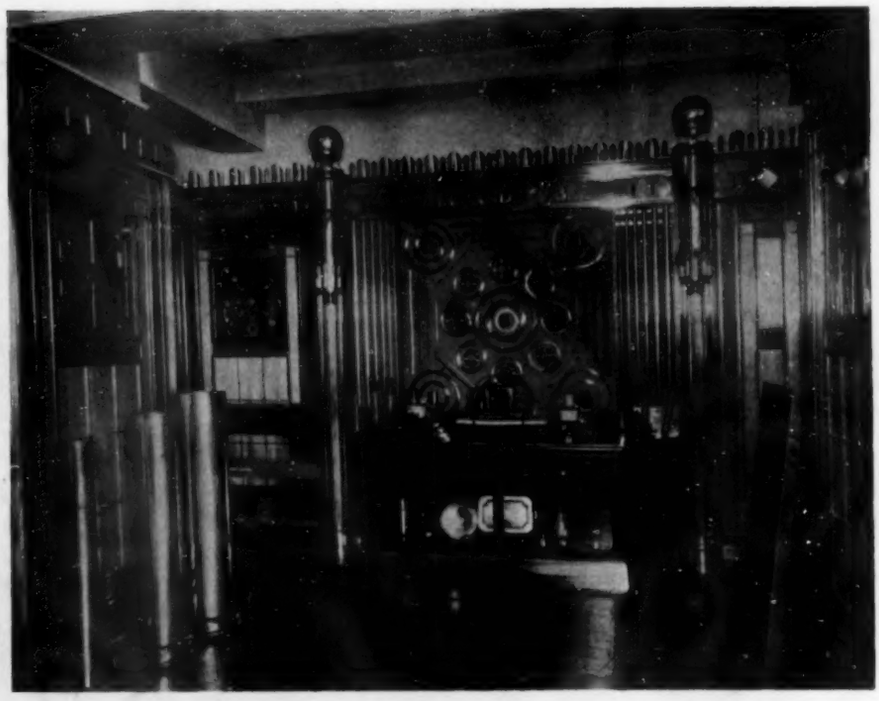
Stampings, castings, articles made by spinning, welded joints, thin metals, electrolytically deposited, as well as round, square and oval tubes, sheet and strip, all shapes of rod and wire, extruded sections, bus bars, screens and hundreds of items offer splendid opportunities for study.

In addition there are finished products such as art and giftware, furniture, window sash, hardware, railings, brass and copper plumbing and many similar items.

An invitation is extended to all the readers of **Metal Industry** to come and inspect their display. Anyone interested will be given all possible information relating to the use of these products.



A View Showing Tubes and Cable



A View Showing Strip and Special Forms

EDITORIALS

Progress in Theoretical Metallurgy

AT A time when the major consideration is to strain both ends of the budget to make them come within hailing distances to each other, it is heartening to know that not only are practical improvement and development moving ahead, but also fundamental research and investigation into the basic facts in metallurgy. An interesting review in the January issue of Mining and Metallurgy by A. J. Phillips, points to a number of the steps taken.

One of the important improvements has been the development of new alloys containing vital constituents in almost infinitesimal amounts. A realization of the importance of these minute quantities of addition agents has brought about an almost unheard of care in the selection of raw materials and also the installation of precise equipment for temperature and time control; these being made necessary by the recognition of the widespread occurrence of precipitation hardness in metal systems.

Basic investigations are being conducted as actively as possible under present conditions, to gain an understanding of fundamental metallurgical phenomena. Data are being accumulated which will some day form the foundation of a true understanding of plastic deformation. It may be possible soon to co-relate or classify the many binary systems now known, and thereby to detect any data which may be inaccurate and also to increase the ease with which the more complex alloys are considered.

We say, forward, to this type of work. Its practical benefits are not so easily discernible as a new process or a new alloy. Its ultimate benefits are the solid foundation on which practical improvements rest. Fundamental research is indispensable in the long run.

Business in the New Year

BUSINESS showed steady improvement in December and the first half of January. This does not necessarily mean that operations are going on at a rapid pace at this time, but simply that they are ahead of last year, and also moving upward, after giving consideration to the normal seasonal recession due at this season. Steel production has continued to advance steadily, being now over 50% capacity. Machine tool orders have advanced sharply. New capital issues floated for corporate purposes moved up visibly in December, even after November had shown a gain over October. These increases were reflected in the number of employees at work and also the total wages paid. Unemployment declined by 463,000 from November.

The bulk of this rise is directly traceable to the sharp increase of operations in the automobile industry; 24.6% more hours in December than in November. Machine tool order increases, and the steel production rise can easily be credited to such a large gain in such a powerful industry. How effective it is in the non-ferrous metals is shown by the fact that automobiles use 19% of our copper, 39% of our lead, 23% of our aluminum, 28% of our nickel, and so on.

At the time of writing, a large number of our smaller industries are suffering from seasonal dullness. It is quite probable, however, that continued improvement in our basic industries will be effective in bringing up with them the secondary and allied activities. Another month should tell the story.

Government in Business

WE ARE all familiar with the age-old slogan "More Business in Government—Less Government in Business." The fact is, however, at least since 1930, that the reverse has been the case, and today we have the Government in business, indirectly through its loans and the laws drawn especially for business, and directly in a large number of enterprises. The Government is now a most important element in business—we are faced with the fact that Congress is in session.

What will Congress do? Probably to a great extent it will do what the President orders. But what else? Will it pass ridiculous measures over his veto? Will it enact a bonus law to be paid with $2,000,000,000 in wall-paper money? Will it continue to "do something" more for silver? Will it enact a 30-hour week, which is likely to disrupt our industrial structure? There are schemes in the offing which include such madhouse affairs as the Townsend plan. Will the left wing of Congress run away with the country?

We are committed to a huge spending program for work relief, amounting to about $4,000,000,000. We know that even this enormous total cannot by itself lift the country out of a depression. Four billion dollars is only a small portion of the total construction work done in the United States in a normal year. Will these Government expenditures "prime the pump" and encourage private capital to go ahead, or will they create distrust and prolong hesitation. If business hesitates how long can the Government spending program go on, before we must either stop or resort to inflation?

All broad-minded citizens admit the need for and the value of social legislation. The days when a whole

family would toil at home to make $12.00 or $15.00 a week in all should be put far behind us. But is not recovery our first problem? Would it not be more effective to get back on our feet safely, and then turn our attention to further improvements in our social structure? The pump priming operations of the Government, necessary perhaps as they are, and inevitable as they seem to have been, must be of such character as to facilitate the return of the unemployed to their normal employment in industry and the return of business to its normal activity.

Perhaps the best statement is that the Government should compete directly with business as little as possible, for as short a time as possible and pay for its labor at rates that will not lure men away from private endeavor. (These points incidentally were specifically covered in the President's message to Congress). And last, but far from least, we must move toward a balanced budget!

We are beset at the same time with conflicting statements and aims from different Administration executives, each of whom has his pet project and perhaps even his pet plan. About these divergent and sometimes clashing points of view, the less said the better. Perhaps it would be a good thing to eliminate statements to the press on administration policies for a while, except from some central, recognized authority.

We are faced with the indubitable fact that the Government is in business. This means that Congress, which is in session, is in business. It is also a fact that the money to be gathered and spent by Congress is other people's money, and the losses are other people's losses. We could wish for more confidence in its plans.

Unemployment and Old Age Pensions

FOR ages the controversy has raged about unemployment and old-age pensions. They have been called everything from a Government duty to its people and a sovereign preventive for depressions, to sappers of the strength of the people, the worst form of paternalism.

Now we are faced with the fact that unemployment and old-age pensions are practically here in the form of the Wagner bill under consideration by Congress, which has the approval of the Administration. The question is no longer whether or no, but what kind.

Our only hope of judging any plan, whatever its source, is by the experience of others, since we have none of our own. What precedents have we to guide us? The British have had unemployment insurance for a number of years. It can be safely stated they have found unemployment insurance to be no remedy for depressional unemployment. They know that its administration must be honest, efficient and based on an accurate knowledge of the facts of unemployment. It has been stated many times by opponents of such measures that seasonal and casual unemployment tend to become permanent under such relief plans; that such insurance is helpless in the face of chronic unemployment due to permanent loss of trade. We know also that any plan must be accompanied by unemployment relief for workers who remain unemployed so long as to lose their rights to insurance benefits. So much for the dark side of the picture.

We have in this country some plans in operation, comparatively small in scale, of course, but large enough to act as something of a guide. The General Electric unemployment pension plan has gone through its emergency period and is now operating on a permanent basis, which means that at least from a fiscal standpoint, it has been successful.

The details of the pending Bill are obviously too many for a complete discussion in these columns. It will probably also be subjected to considerable revision before it is passed. The important factor, at this moment, however, is not detail but the general principle—caution. We know that in the United States, reliable information concerning the extent and nature of unemployment is almost totally lacking. We know that we must have facts before we can proceed safely. We know also that some of our elected legislators are not blest with overmuch common sense. For example we have one prominent senator who perverts statistics by comparing $1,000,000,000 for arms with $15.00 a month for pensions; another who says that not less than $50.00 per month per person will do; a congressman, even more generous with other people's money, who proposes the whole of that fool's paradise, the Townsend plan.

If ever in our history we had a situation where the best of intentions might do the most harm, we have it now. We need wisdom.

Scrap to the Primary Smelters

IN STATISTICS, given on page 78 of this issue, it is shown that in 1934 the primary copper refiners produced 124,000 tons of metal from secondary sources, 52% of the primary output; 34,100 tons of lead from scrap; 11% of the primary; 18,886 tons of zinc from scrap, 6% of the primary. The proportion of copper from scrap produced by primary refiners increased from 35% in 1933 to the 52% given above, a record percentage.

Here is a change that has come about by "natural" causes to be sure, but nevertheless one which must be examined with a clear vision.

Is the secondary smelter going out? We do not need to go far for examples of large primary smelters actively entering this field. Every primary refiner of any importance has gone into the secondary field, readjusting his operations to handle scrap. Their great advantage over the strictly secondary smelter lies in their ability to produce and sell by-products of all kinds, instead of only ingots. They can make bluestone and pigments, for example. Their equipment is such as to make it possible for them to extract small quantities of minor impurities instead of suffering from their contamination, and resorting to dilution. The ingot maker is a metal producer. The primary refiner produces not only metals but chemical products as well.

It will pay the secondary smelters to consider their situation seriously. They are meeting, as never before, a competition of enormous strength.

Correspondence and Discussion

Eliminating Oxalic Acid From Nickel Solution

To the Editor of **Metal Industry**:

We wish to thank you for your advice of November 23 relative to the oxalic acid added to a nickel solution. We were fortunate in procuring the remedy for this sometime earlier through a local chemist, and his suggestion was the same as yours, with the exception that the solution was to be heated to 140° before adding the hydrogen peroxide in order to increase the reaction.

It appears from recent samples of the plating that the oxalic acid has been completely oxidized out of the solution, and we are having no trouble, whatsoever, with it at the present time. However, while this oxalic acid was in the solution, the nickel plating was harder than we had previously had in our work, but not hard enough to effect the chromium deposit over it.

Thanking you for your promptness in assisting us in remedying this trouble, we are

TOMLINSON NO-DRIP FAUCET COMPANY.
Cleveland, Ohio. H. E. Tomlinson, Gen. Mgr.

Everyone in the Business Should Subscribe

To the Editor of **Metal Industry:**

I am a Foreman Plater, Polisher and Buffer, but I can work on the wheel as well as supervise. I believe that everyone connected with the business should be a subscriber to **Metal Industry.**

Chicago, Ill. JOSEPH W. J. MEYER

New Books

Die Castings. By Herbert Chase. Published by John Wiley and Sons, New York. Size 6 x 9; 264 pages. Price $3.50.

For an art which has grown so rapidly in the past few years, there are surprisingly few books on the subject of die castings. For that reason as well as others, this volume is welcome.

The book approaches the subject from an unusual angle. Its main concern is with the product itself, the compositions, uses and design, covering the technical possibilities of die castings, the characteristics of various alloys used, the intelligent design of die castings, specifications, inspection and testing of die castings, and lastly, an outline of the types of finishes available. In other words, the book is meant more for the user and purchaser than for the manufacturer of die castings. At the same time the manufacturer will do well to have this book in order that he may improve his understanding of the subject from the angle of his customers.

What's Ahead for Business in 1935? By N. W. Pickering, president, Farrel-Birmingham Company, Inc., Ansonia, Conn. An address delivered before the Ansonia Chamber of Commerce, January 8, 1935.

This address presents as fairly, clearly and concisely as anything we have ever seen, the point of view of the producer of durable goods and his reaction to the measures now being taken by the Administration.

The author has analyzed clearly the comparative depths of the depression in various industries, showing that 50 per cent of the unemployment exists in the durable goods industries. He states explicitly that our social reform measures are a hindrance to recovery. Other countries which have not undertaken such a program, are ahead of us on the international chart of business. Spending for prosperity or spending our way out of the depression is an economic fallacy. Increasing wage rates with the expectation that such increases would permit greater spending is another fallacy. Shorter hours reduce wage incomes. Crop reduction increases living costs. Taken as a whole, Mr. Pickering considers the "New Deal" a costly failure.

Industry has a recovery program presented by the National Association of Manufacturers. Mr. Pickering urged his hearers to back this program as a practical method of pulling us out of the slough.

Pending legislation is adversely affecting business. Many radical bills will be introduced; as a result business confidence is lacking. Business endorses the Federal Housing Administration as administered and planned by J. F. Moffet. He distrusts the group headed by Secretary Ickes. Unemployment insurance and old-age pensions are something to be feared because, as Mr. Pickering believes, they are being enacted without sufficient information and without regard for practical economic consideration. The continued enormous deficits are another cause for worry. Pending public utility legislation is most important as an indicator that Government intends to extend its operations in competition with business.

As stated above, this is the point of view of one prominent industrialist. It is, however, undoubtedly the point of view of a large proportion, if not an actual majority of American business men. It should be read carefully as an honest, straight-from-the-shoulder statement.

Technical Publications

Preparation of Pure Gallium. By James I. Hoffman. Research Paper RP 734. National Bureau of Standards, Washington, D. C.

Effect of Cold-Rolling on the Indentation Hardness of Copper. By John G. Thompson. Research Paper RP 742. National Bureau of Standards, Washington, D. C.

Influence of Chemically and Mechanically Formed Notches on Fatigue of Metals. By D. J. McAdam, Jr., and R. W. Clyne. Research Paper RP 725.

Determination of Nickel Plate on Nickel-Plated Copper Wires by the Method of Glazunov. Chemy Obzor, 1934, volume 9, pp. 104-7. By V. Petak and F. Honzik. An abstract appeared in The Nickel Bulletin of the Mond Nickel Company, Nov.-Dec. 1934.

The thickness of nickel plating deposited on copper wire is determined by a method based on measurement of the potential between the anode and the electrolyte. By means of voltage readings, taken at short intervals during anodic solution of the nickel coating, and by observation of time and current density, calculations are made of the thickness of the nickel layer.

Government Publications

Lead Industry in 1934—Advance Summary. U. S. Bureau of Mines, Washington, D. C.

Vocational Education and Changing Conditions. Changing economic and social conditions and their effect upon vocational education. Vocational Education Bulletin No. 174, issued by the U. S. Department of the Interior, Division of Education, Washington, D. C. For sale by the Superintendent of Documents, Washington, D. C. price 15 cents.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical, Foundry, Rolling Mill, Mechanical Electroplating, Polishing, and Metal Finishing

H. M. ST. JOHN W. J. PETTIS O. J. SIZELOVE
W. J. REARDON W. B. FRANCIS WALTER FRAINE

Appearance of Chromium and Nickel

Q.—Will you please tell me the way to find the difference between chromium plate and nickel plate after it is buffed.

A.—Deposits of nickel and chromium are very readily distinguished by their color. Nickel deposits have a light yellow cast compared with the blue white or bluish color of chromium.

Sometimes it is a little difficult for those not entirely familiar with the difference in color to distinguish between the two, but if a piece of white tissue paper is used to shade the deposit, with the contrast between the two deposits, it is readily noticeable. O. J. S., Problem 5,355.

Bright Gold

Q.—Some time ago you published a gold plating solution to be used for fine gold deposits on electrical instruments. We have used this solution for jewelry plating and find that it puts on a very heavy deposit but it comes out very dull; we might call it a poor yellow rose color. What can we add to this solution so that it will plate bright instead of dull?

A.—This solution for your class of work is too concentrated, and should be diluted with water. Take one half of the solution from the crock or tank and then add water to proper solution level. Operating conditions same as given.

O. J. S., Problem 5,356.

Dull Bronze Finish

Q.—For many years we have furnished badge parts in a dull bronze finish like samples enclosed and this formula has been destroyed. Is it possible for you to give us an inexpensive dip finish to reproduce this color over copper parts. The color is protected by transparent lacquer.

A.—The light bronze color on the samples submitted has been produced in a solution made of copper sulfate, 4 ozs.; potassium chlorate, 1 oz.; water, 1 gallon.

The darker color has been produced by adding 1 oz. single nickel salts to the above formula.

The solution is used at a temperature of 180-200 deg. F. and the length of time the work is left in the solution is 1 to 4 minutes.

A scratch brush operation is generally used to produce a finish with a high lustre but the finish submitted has not been scratched brushed. O. J. S., Problem 5,357.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.:.....**Cathode surface, sq. ft:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:**.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible

Use separate sheet if necessary. _____

_____

_____

_____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

Impure Copper Solution

Q.—Enclosed is blank for solution analysis. I recently made 6 solutions and they all work like a charm except the acid copper. All solutions were made from **Metal Industry** formulae. I have been advised to add 1 gallon of molasses to this solution, but have not done so as yet.

A.—From the amount of chemicals used in preparing the acid copper solution you should have no trouble. This trouble of a rough streaky deposit in my opinion is caused by some impurities that have been introduced into the bath, and this trouble can be overcome by adding hydrogen peroxide to the solution.

Would suggest that you add 1 quart of 30 volume hydrogen peroxide to each one hundred gallons of solution. This should overcome the trouble but if it does not, then advise us.

O. J. S., Problem 5,358.

Obtaining a Rough Deposit

Q.—We are interested in obtaining information as to how to plate a rough but adhering metal surface onto copper; the metal to be plated to be copper or some other inexpensive metal.

A.—Deposited metals as a rule are quite smooth and none of them would do for your purpose. There are two ways of producing a rough metallic surface. The first and the cheapest way would be to matt dip or sand-blast the surface of the metal and then plate with any metal. The other method of producing a rough metallic surface is by the use of the Schoop method. With this method the metal desired is sprayed direct upon the surface of the object to to coated and the surface is quite rough.

O. J. S., Problem 5,359.

Rust Prevention

Q.—May I direct a question to you regarding iron products rusting when they come in contact with moisture? I want to overcome this rusting if possible. I'll explain my problem and see if you might have a recommendation to make. First, I have a gadget which I place iron products on. The gadget and these iron products are constantly coming in contact with moisture and this causes the iron product to rust. But my gadget does not rust because it is made of rust proof materials, such as copper brass, phosphor bronze etc. I have these metals nickeled over for appearance which is absolutely essential for my product. Now when I place iron products on these rust proof gadgets and they both come in contact with moisture the iron products rust and they even deposit rust on my rust proof articles, that is the copper, brass and bronze.

There are two ways in which I overcome this rusting, but neither way is to my entire satisfaction. One way is to have the rust proof gadgets cadmium plated and then the iron products don't rust even though they come in contact with moisture often. But the objection to the cadmium plating is that it oxidizes and turns dark which absolutely prevents me from using the cadmium plating. I have tried transparent lacquer over this cadmium but this lacquer cracks and peels off; evidently more so because it comes in contact with moisture so often. After the lacquer peels off then of course, the cadmium oxidizes. Result, no success.

It might be successful if there were a transparent lacquer on the market which would not crack and peel off, regardless of the moisture condition. Although I sometimes wonder if it is the moisture that makes this transparent lacquer peel off or the chemical action of the cadmium underneath the lacquer that causes the lacquer to peel. You may be able to answer this question.

The second way I overcome the rusting of the iron products is to make my product of nickel plated zinc. Well I just can't explain very successfully why I can't make my product of zinc except to say first that zinc complicates my product and second, I must have a product of spring type such as phosphor bronze.

If I could keep cadmium plating from oxidizing my problem would be solved 100%.

You may say why use the iron products which rust at all? My answer is that I use iron products because the product as sold on the market is made of iron and will be made of iron always. Furthermore the possibility of coating this iron product is absolutely out of the question as the iron used in these products comprises only part of the product. I can't explain any more than to tell you that I can't use any other but iron products. The problem can be only solved by plating my gadgets with such a plating as cadmium which will not oxidize.

I'll tell you all the metals I have experimented with in trying to overcome this rusting problem: stainless steel, Monel metal, German silver, aluminum and lead coated sheet iron. I have coated phosphor bronze with nickel, chrome, bronze coating, tin coating and German silver. None of these are successful.

The only successful thing I have tried is coating with cadmium and making the product partially with zinc. Each of these has its handicaps as I have explained.

A.—When cadmium deposits are lacquered to prevent tarnishing, a special grade of lacquer is used. The breaking down of the lacquer film is probably due to the moisture, but I would suggest that you consult the lacquer manufacturers who advertise in The **Metal Industry** about a special lacquer to meet both requirements.

Cadmium deposits for such work as you wish to do could be plated in a tin solution for a few minutes to prevent tarnishing. If the cadmium deposit is scratch-brushed before tin plating a very nice looking job will be obtained. It is not advisable to nickel plate over the cadmium deposit as there is a tendency for the deposit to blister. You might be able to use a deposit of cadmium, tin and zinc for it is very resistant against corrosion, and the deposit will not tarnish as will a deposit of cadmium. If you are interested in this method, we shall be pleased to send you details.

O. J. S., Problem 5,360.

Solution Analysis

Q.—Please give us the analyses of the silver, gold and brass solutions which we are sending under separate cover.

A.—Analysis of silver solution:

Metallic silver	2.10 ozs.
Free cyanide	.49 oz.

The free cyanide content is too low. Add 3 ozs. of sodium cyanide to each gallon of solution.

Analysis of gold solution:

Metallic gold	5.1 pwt.
Free cyanide	.82 oz.

This solution should be operating satisfactorily.

Brass solution:

Metallic copper	2.27 ozs.
Metallic zinc	.42 oz.
Free cyanide	.98 oz.

Add 1 oz. of sodium cyanide to each gallon of solution. Operate solution at 80°F., and if color is too red, add a small quantity of 26° ammonia. O. J. S., Problem 5,361.

Spongy Copper

Q.—In reference to acid copper solution, original contents 3 fluid ozs. H_2SO_4; 28 ozs. copper sulphate per gal.

Every time my solution dries up from evaporation the deposits get spongy. How am I to correct this? Am sending a sample for analysis. Please recommend the additions.

A.—Analysis of acid copper solution:

Metallic copper	6.06 ozs.
Sulfuric acid	2.29 ozs.

This solution should be operating satisfactorily. Keep the solution level to its proper height by the addition of water and if you wish to adjust the metal and acid content to the original formula, add 4 ozs. of copper sulfate and ¾ of an ounce of sulfuric acid to each gallon of water.

O. J. S., Problem 5,362.

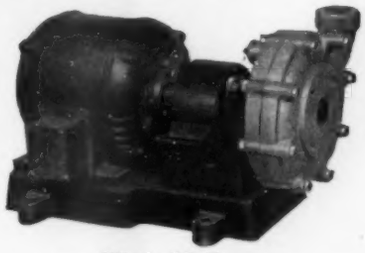
Equipment

New and Useful Devices, Metals, Machinery and Supplies

New Type Centrifugal Pump

The American Hard Rubber Company, 11 Mercer St., New York City, offers their new type W A M pump in the belief that it is the finest in the non-metallic field for medium capacities up to 90 gallons per minute at 12 ft. head.

The casing of this pump is made of acid-resisting hard rubber and is also heat and distortion resisting. It is mounted to the base by means of acid-resisting hard rubber covered casting which acts as a chamber to catch drip from the stuffing box. By-pass is adjustable and cored right into back casing. The motor shaft is especially extended, tapered and pinned into the pump shaft with all parts interchangeable.



W. A. M. Pump

The manufacturer has prepared a folder which gives complete information, capacity chart, etc. This is available, with prices, to anyone interested. Write attention of Chemical Equipment Sales Division.

New Portable Pyrometer

The New "Hold-Heet" Pyrometer Lance is made by the Russell Electric Company, 342 West Huron Street, Chicago, Ill. This company is now offering a pyrometer of the portable or lance type at the remarkably low price of $16.00. This price includes the complete equipment with the exception of the thermocouples which vary in price from $1.00 to $3.00, depending upon the type that is selected. Meters are available for three different temperature ranges of 800-1600-2500° F. The instruments are of the low resistance type, thereby, it is stated, combining high accuracy in combination with very rugged construction. The entire protecting case and handle is a single aluminum casting.

These portable hand instruments are recommended for checking temperatures in all the applications where a wall type pyrometer is used. For general use it has the additional advantage of portability. It is especially recommended as an exploring instrument to gather heat data in chemical and industrial processes; as a "trouble shooter" and as a check tester in existing pyrometer installations.



Single Portable Pyrometer

The complete information bulletin will be mailed free on request.

New Respirator

In line with the improvements on their other respirators, the Chicago Eye Shield Company, 2317 Warren Blvd., Chicago, Illinois, have altered the design of their No. 82 Respirator to give maximum wearing comfort and to make it a more efficient dust protective device.

Some of the improvements claimed include an anatomically shaped face cushion moulded on soft, non-toxic rubber, a replaceable knitted cloth facelet and the improved one-way diaphragm relief valve.

Type No. 82 has two wire screens and filter element held in position by a screw cap. All inhaled air is drawn through the filter and an automatic check valve prevents exhaled air from passing back through the filter.

The filtering element is easily replaceable by means of the screw cap. It can be had with either Cesco Silica Filter or Cesco Cal-Coral Sponge Filter. Both types are said to be very efficient for fine dust particles yet offer little resistance to normal breathing.

This Respirator is not to be confused with Type No. 81 which has a chemical cartridge and used for nose, mouth and lung protection against light concentrations of injurious or obxnoxious gases and vapors.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Electric Hand Grinder; with Bakelite body and high speed motor. Skilsaw, Inc., 3310 Elston Avenue, Chicago, Ill.

Miniature "C" Clamps; one inch depth of throat and one and two inch openings. Adjustable lamp Company, 417 N. Ashland Avenue, Chicago, Ill.

New Electrode for Hardening and Cutting Edges on All Kinds of Tools. Lincoln Electric Company, Cleveland, Ohio.

Varidrive Motor. An improved type of variable speed motor. U. S. Electrical Manufacturing Company, Los Angeles, Calif.

Koroseal. A new plastic material said to be superior to rubber for a wide variety of products. The B. F. Goodrich Company, Akron, Ohio.

Electric Governor Controlled Motors; rated from 1/64 to ⅛ H. P. over a range of 1000 to 7500 RPM. Dumore Company, Racine, Wisc.

"Noel" Speed Arc Welder; featuring unity power factor motor drive. Ideal Electric and Manufacturing Company, Mansfield, Ohio.

High Temperature Fire Cement

A new type of high temperature fire cement called Obturit is being distributed by Pearson, Peppard and Company, Inc., 68 Beaver Street, New York, exclusive general sales agents. This fire cement is recommended for laying up brick work, patches and repairs, and as a wash for industrial and foundry furnaces of any description. It is applicable to oil, electric, open flame gas and fuel fired furnaces. It may be used, according to the manufacturer's statement, for ladles, ingot molds and for the cast iron crucibles used in aluminum melting and casting work.

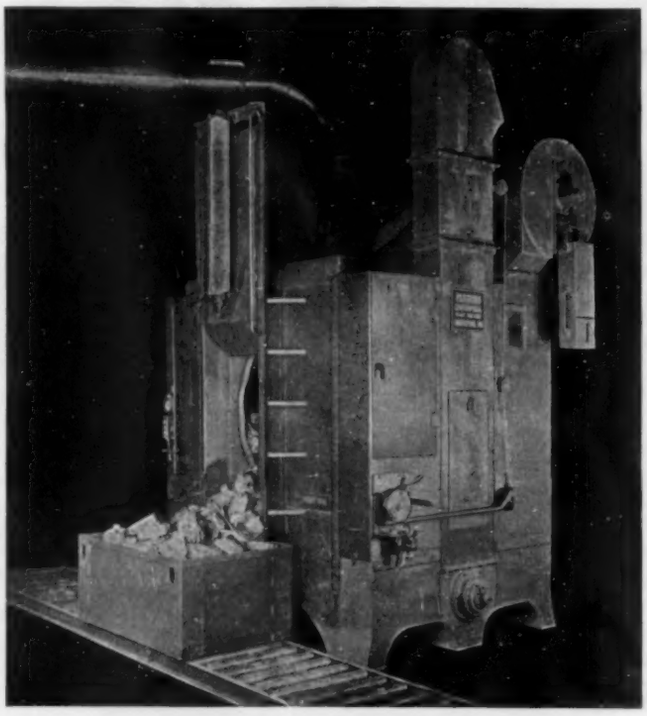
Obturit, it is claimed, withstands up to 3300° F., starts to vitrify at 1800° F., fluxes perfectly with hot brick and does not shrink or crack.

Centrifugal Blast Cleaning Machine

Pangborn Corporation, Hagerstown, Maryland, has just issued a bulletin describing the new Centrifugal Blast Cleaning Machine that cleans various size and shape castings without the use of compressed air. This machine cleans loads up to 18 cu. ft. in bulk and averaging 2,200 pounds in weight, in times which vary from 7 to 15 minutes, depending upon the characteristics of the castings.

The interior of the unit has two revolving drums and a stationary "armor plate" strip through the center. The action of the revolving drums throws the castings onto this center strip directly under the abrasive stream created by a revolving wheel. In this manner each individual casting is thoroughly cleaned on every surface it is claimed, no matter how complicated its design might be.

The operation of this machine is said to be simple. The loading door is opened and closed by a quick acting, easily controlled cylinder. An electric measured time clock automatically operates a warning signal when cleaning is completed. Abrasive is used over and over again, being thoroughly cleaned and handled by the separator and elevator units built into this equipment.



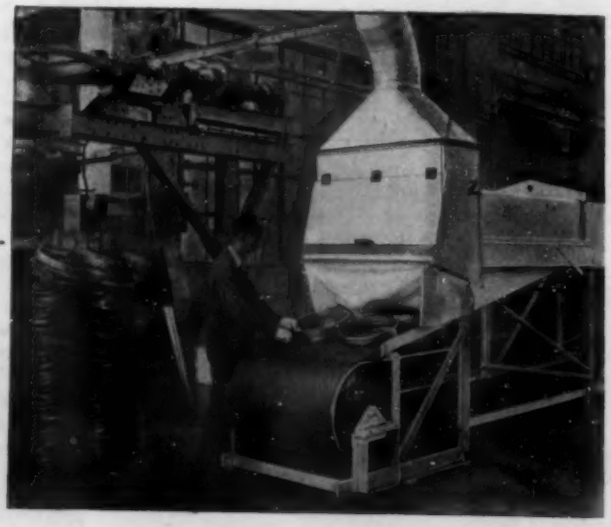
Pangborn Centrifugal Blast Machine

Electric Furnace Cuts Heat-Treating Cost 50%

"The new electric furnace which bright-anneals our copper tubing," says President C. C. Limbocker of the Wolverine Tube Company, Detroit, Mich., "is helping us to increase sales because it has materially improved quality. Our tubing is now more uniform, and as a result of the dry-annealing feature of the furnace, water spotting has been entirely eliminated. Our annealing costs have been cut in half. The cost of the electricity per pound of tubing annealed is only one-tenth of a cent.

"With this new furnace we are able to give our customers quick shipment on small orders. Its flexibility is outstanding. It handles all our products—straight and coiled tubing, finned tubes, and formed pieces; whereas before we installed it, three furnaces were required."

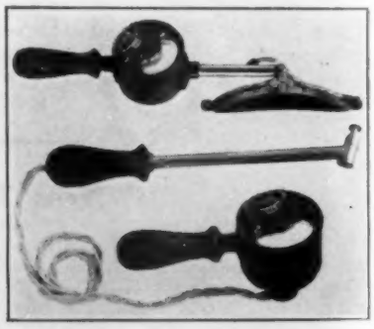
The furnace used was installed in August, 1934. It is a new General Electric controlled-atmosphere, continuous, mesh-belt-type furnace. Its atmosphere is supplied by a G-E combustion-type furnace-atmosphere controller, which reforms a mixture of city gas and air.



Electric Bright Annealing Tube Furnace

Surface Pyrometers

The Pyrometer Instrument Company, 103 Lafayette Street, New York, describes in its bulletin No. 30 its surface pyrometers in which, it is stated, the contact and the reading of the actual temperatures no longer have to be made simultaneously. These pyrometers are portable and it is stated, rugged and compact.



Surface Pyrometers

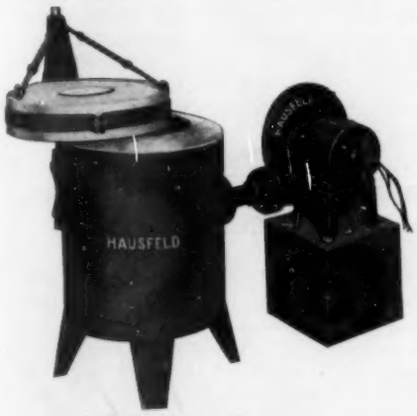
The method of operation is briefly as follows: While making contact between the thermocouple plate and the surface to be measured, press a red button on the face of the indicator with the thumb of the hand holding it. Keep it pressed for a few seconds, making sure that proper surface contact is made, and that the pointer has had time for

deflection. Before removing the thermocouple plate from the surface, release the pressure on the red button and the dial shows a fixed indication of the temperature measurement. Another pressure on the red button sends the pointer back to zero.

The illustration shows a typical Pyro surface pyrometer. Any length of handle can be furnished to suit requirements. The temperature range of this line is from 30 to 1,000 degrees F.

Laboratory Furnace

Campbell-Hausfeld Company of Harrison, Ohio, builders of gas and oil fired melting furnaces have added to their line a small gas fired crucible furnace for the melting of previous and non-ferrous metals. This small furnace is



Laboratory Furnace

fully equipped. All that is required for operation is to connect the gas line to blower and motor to the light socket. Furnace is lined with a special high temperature lining and is built to accommodate any size crucible from a No. 8 to a No. 30. Note the lift swing refractory top for easy access to the crucible. The furnace is guaranteed by the manufacturer. The features claimed for this unit are low cost of installation and operating expense.

New Catalogs

The duPont Company and Munitions. A pamphlet presenting a full account of its activities that come under the head of munitions. E. I. duPont de de Nemours and Company, Inc., Wilmington, Dela. (296)

Duprene. A story of man-made rubber. E. I. duPont de Nemours and Company, Inc., Wilmington, Dela. (296A)

Quarterly Price List. R. & H. Chemicals Department, E. I. duPont de Nemours and Company, Inc., Wilmington, Dela. (297)

A List of Metal Specialties and Metallurgical Products. Scrap, etc. purchased by the Metallurgical Products Company, Philadelphia, Pa. (298)

Dark Field Optical Systems. Bausch and Lomb Optical Company, Rochester, N. Y. (299)

New Temperature Indicating Equipment; for A-C generators, motors and transformers. General Electric Company, Schenectady, N. Y. (300)

A New Bimetal Handbook; describing Truflex, a thermostatic bimetal. General Plate Company, 35A Forest Street, Attleboro, Mass. (301)

Multidrive Belts. Worthington Pump and Machinery Corporation, Harrison, N. J. (302)

Vertical Four-Cycle Gas Engine. Worthington Pump and Machinery Corporation, Harrison, N. J. (303)

Steam Booster Compressors. Worthington Pump and Machinery Corporation, Harrison, N. J. (304)

Handy Devices for Scientific Instruments, Recorders, etc. Esterline-Angus Company, Indianapolis, Ind. (305)

Engineering Data on Mechanical Rubber Goods. A guide to the selection of belting, hose and other rubber products. B. F. Goodrich Company, Mechanical Division, Akron, Ohio. (306)

Tabloid First-Aid for Industry; describing Tannafax for treating burns. Burroughs Welcome and Company, 9 E 41st Street, New York. (307)

Non-Sparking Tools; made from Anaconda beryllium copper. Stanley Tools, New Britain, Conn. (308)

Higher Wage Rates Lower Workers Annual Income. One of a series of booklets on Labor's Opportunity to Promote Recovery, by Allen W. Rucker and N. W. Pickering, president of the Farrel-Birmingham Company, Ansonia, Conn. (309)

U. S. Standard Jars, Tanks, Stills and Mixers; for acids, extracts, food products, alkalies, pharmaceuticals, chemicals, etc. United States Stoneware Company, Akron, Ohio. (310)

Centrifugal Blast Cleaning Machine; works without compressed air. Pangborn Corporation, Hagerstown, Md. (311)

Correction

In our January issue, page 29, we published a note of a catalog "Polishing, Plating & Finishing Equipment & Supplies," distributed by J. J. Siefen Co. The address was given in error as 1936 W. Lafayette Blvd., Cleveland, Ohio. It should have been Detroit, Mich.

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY
116 John Street, New York.

(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following catalogs mentioned in February, 1935 .....

.....

I want information on the following equipment or materials also: .....

.....

Associations and Societies

Institute of Metals Division

Headquarters, 29 W. 39th Street, New York

The winter meeting of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, will be held at 29 W. 39th Street, New York, February 18-21, 1935. Dr. C. A. Edwards of the University College, Swansea, Wales, will deliver the Annual Lecture on Thursday, February 21st. He will discuss gases in metals.

The Annual Division Dinner will be held on Tuesday evening, February 19th and the address will be given by D. J. Macnaughton on the Properties and Uses of Tin.

Other papers scheduled for this meeting are as follows:

Internal Surface in Minerals and Metals, by R. S. Dean and J. Koster.

Equilibrium Relations in the Copper Corner of the Ternary System: Copper-tin-beryllium, by Elliott S. Rowland and Clair Upthegrove.

Studies Upon the Widmanstatten Structure, VII.—The Copper-silver System, by Charles S. Barrett, Herman F. Kaiser and Robert F. Mehl.

Physical and Casting Properties of the Nickel Silvers, by T. E. Kihlgren, N. B. Pilling and E. M. Wise.

Crystallographic Uniformity of Lineage Structure in Copper Single Crystals, by Alden B Greninger.

Theory and Use of the Metallurgical Polarization Microscope, by Russell Wendt Dayton.

Properties of the Platinum Metals, I.—Strength and Annealing Characteristics of Platinum, Palladium, and Several of Their Commercial Alloys, by E. M. Wise and J. T. Eash.

The Use of Metals in the Petroleum Industry. A symposium to be held jointly by the Petroleum and Institute of Metals Divisions in the morning; in the afternoon the Iron and Steel Division will also participate.

American Electro-Platers' Society

1935 Convention, June 10-11-12-13 Hotel Stratford, Bridgeport, Conn.

Those who plan to attend the 1935 Convention & Exhibition of the American Electro-Platers' Society to be held in Bridgeport, Connecticut, June 10-11-12-13, will surely carry back home with them pleasing memories of their visit to the "Industrial Capital of Connecticut."

Bridgeport possesses many attractions that few cities—industrial or otherwise—can equal or surpass. An industrial city, yes, but with a beautiful location on Long Island Sound, beautiful parks, beautiful homes, unexcelled bathing beaches, good hotels, up-to-date theatres, fine restaurants and meeting facilities, charming suburbs, careful and courteous traffic regulations.

Bridgeport early became important as a trading center because of its excellent harbor and owing to its location in what was then a rich farming region. When the industrial era arrived, these same advantages—combined with its nearness to the New York market—encouraged the manufacturers of a century ago to locate here. Needless to say, Bridgeport's tremendous industrial development is its chief characteristic today and has earned the city its sobriquet of "The Industrial Capital of Connecticut."

Bridgeport, first known as "Pequonnock," received its first white settlers in 1639. In 1701 the name was changed to Stratfield—a combination of Stratford on the east and Fairfield on the west—and in 1836 Bridgeport was incorporated as a city.

Not only is Bridgeport's water-borne commerce large and important, but the city's location on Long Island Sound furnishes one of its greatest natural attractions. Long Island Sound is 14 miles wide at this point and the expanse of blue sea lying at Bridgeport's front door is one of her assets that inland cities may well envy. The beaches, too, are one of Bridgeport's chief attractions. Within walking distance of the main business section is Seaside Park, acquired by the city in 1865 through the generosity of P. T. Barnum, the Great Showman, and here excellent bathing facilities are provided.

Bridgeport's reputation rests chiefly on its leading and varied industries. Bridgeport manufactures some five thousand different articles, and does not depend on one class of manufactured products.

There are 50,000 wage earners in Bridgeport, the largest number in any city in Connecticut. The value of the products manufactured annually is over $170,000,000 and many of these products are known the world over. Among these manufacturers are: Singer Sewing Machine Company, Remington Arms Company, Columbia Phonograph Company, American Chain Company, Raybestos Company, Bridgeport Brass Company, Dictaphone Corporation, General Electric Company, Remington Rand, Inc., Underwood Elliott Fisher Company, Crane Company, Warner Bros. Company, Bassick Company, Bullard Company, McKesson & Robbins, Sikorsky Aviation Corporation.

One of the charms of Bridgeport is that a ten-minute ride from the center of the City brings one to real "country"—a series of rolling hills immediately back of the city affording splendid views of typical Connecticut landscape. Several gorges of this wooded area have been made into storage reservoirs by the local water company and are of unusual beauty.

Bridgeport is only two hours from the Litchfield Hills and three hours from the Berkshires. The rugged beauty of the Housatonic and the Naugatuck Valleys, and the more placid beauty of the Connecticut River Valley invite the motorist. Splendidly paved highways run in all directions to the countryside. **On plant visit days, visitors will have an opportunity to view this beautiful countryside.**

Bridgeport's many excellent hotels insure adequate and comfortable hotel accommodations. Meeting facilities for convention groups are well provided. The Stratford Hotel, operated on a metropolitan scale with 475 rooms; The Stratford Annex with 125 rooms; the Barnum Hotel, erected in 1928, with 200 rooms—together with other average hotels of medium size furnish excellent hotel accommodation, and there are also within the radius of a few miles many first-class inns and road houses.

A new municipal park has been acquired recently, the Fairchild Wheeler Park, having one of the finest golf courses in the country.

1935 Connecticut Tercentenary

Connecticut will celebrate her Tercentenary during the year 1935. Visitors to the State during the summer of 1935 will find much of unusual interest planned for this celebration.

There is much of historic interest in Bridgeport and in the old Colonial villages of Fairfield on the west and Stratford on the east. Fairfield is rich in historical interest. There is the stone powder house, the whipping-post on the village green, the Sun Tavern where Washington fed and watered his horses in 1789, and three houses which escaped burning at General Tryon's hands in 1779.

Stratford was settled by immigrants from Shakespeare's birthplace, and it is therefore especially appropriate that in Bridgeort's Beardsley Park there should be erected a duplicate of the famous cottage of Shakespeare's sweetheart in Stratford-on-Avon — Anne Hathaway's Cottage. Several pre-Revolutionary houses in Stratford are worth visiting. The Episcopal Church still bears the original Chanticleer used for target practice by the Red Coats in 1757.

The working committees for the convention are as follows:

General Chairman, **R. J. O'Connor,** 41 Bancroft St., Bridgeport, Conn.

Sec.-Treas., **T. H. Chamberlain,** 797 Orange St., New Haven, Conn.

Publicity, **Eugene Phillips,** Puritan Company, Waterbury, Conn.

Exhibition Manager, **R. T. Phipps,** Bullard Company, Bridgeport, Conn.

Papers, **Geoge B. Hogaboom,** Hanson-Van Winkle-Munning Company, Matawan, N. J.

Hotel, **George Karl,** 126 Manhattan Ave., Bridgeport, Conn.

Program, **George Knecht,** 132 West Elm St., New Haven, Conn.

Visit, **John Oberender,** The Zapon Company, Stamford, Conn.

National Alliance of Art and Industry

30 Rockefeller Plaza, New York 1712 R. C. A. Building,

An industrial arts exposition for manufacturers will be held in the Forum, 30 Rockefeller Plaza, New York, from April 15 to May 15, 1935. One of the important purposes of this exhibit is to demonstrate that beauty and utility are now determining the factors in the lines of all types of consumers. All details can be obtained from the secretary at the above address.

British Institute of Metals

36 Victoria Street, Westminster, London, S. W. 1, England

The British Institute of Metals will hold its annual general meeting in London on Wednesday and Thursday, March 6 and 7, 1935. A report of this meeting will be published in **Metal Industry,** including abstracts of the papers delivered.

United Electroplaters League

799 Broadway, New York

The Fifth Annual Alaskan Dinner Party of the United Electroplaters League was held on January 12, 1935, at 7 P. M. at the Villa Venice, 10 E. 60th Street, New York. More than 200 members and guests were present at this outstanding stag affair. An excellent dinner was served with plenty of additional refreshments later, and some of Broadway's finest talent were procured to keep the assemblage amused.

A public installation was held of newly elected officers.

American Society for Testing Materials

260 S. Broadway, Philadelphia, Pa.

The 1935 Regional Meeting of the American Society for Testing Materials will be held on March 6, in conjunction with the Spring Group Meetings of the A. S. T. M. Committees from March 4-8. At the time of writing, the hotel at which the meetings will be held was not yet decided upon, but this information can be obtained from the headquarters of the Society given above.

The feature of this meeting will be a symposium on paint which will include a paper on Lacquer and Lacquer Testing, by H. E. Eastlack, director, Parlin Laboratory, E. I. du Pont de Nemours and Company, Wilmington, Dela.

American Zinc Institute

Headquarters, 60 E. 48th Street, New York

"Seal of Quality" galvanized sheets will be shown at a number of meetings during the winter of 1935. The following exhibits have been scheduled.

February 4-5. Sheet Metal Contractors Association of Wisconsin, Republican Hotel, Milwaukee, Wisc.

January 29-February 9. Florida Fair, Tampa, Florida. Space 7, Brorein Hall.

February 12-14. Illinois Lumbermen's Convention, Stevens Hotel, Chicago, Ill.

Personals

Old Brass Foundryman Retires

After 52 continuous years of work in the brass foundry, **Otto Gerline,** president of the Gerline Brass Foundry Company of Kalmazoo, Mich., has sold his business and retired. He will spend the winter in Florida in the manner in which he enjoys best—fishing.



OTTO GERLINE

Mr. Gerline is familiar to readers of **Metal Industry** by his most entertaining and informative series of reminiscences, "A Brass Foundryman's Progress."

Metal Industry speaks for the entire foundry industry individually and collectively, in wishing Mr. and Mrs. Gerline a long and happy life.

B. B. Caddle

The Copper & Brass Research Association, 25 Broadway, New York, has been reorganized with the mining companies withdrawing and eight of the nation's leading fabricating units carrying on. These are:

The American Brass Company, Waterbury, Conn.
Bridgeport Brass Company, Bridgeport.
Chase Brass & Copper Company, Waterbury, Conn.
Mueller Brass Company, Port Huron, Mich.
Phelps Dodge Copper Products Corporation, 40 Wall St., New York.
Revere Copper and Brass Incorporated, 230 Park Ave., New York.
Scovill Manufacturing Company, Waterbury, Conn.
Wolverine Tube Company, 1411 Central Ave., Detroit, Mich.

Bertram B. Caddle, Secretary, is in charge of the promotional work of the Association, Dr. H. Foster Bain, Managing Director, having resigned, is now in Australia on a business mission for a sulphur corporation.

Mr. Caddle has been with the Association almost since the day it started functioning some 13 years ago. He was assistant to W. A. Willis, Manager, for a number of years and then was elected Secretary. Since joining the organization Mr. Caddle has been in charge of advertising and publicity in addition to answering all non-technical inquiries.

Born in Wheeling, W. Va., Mr. Caddle graduated from Wheeling High School and Elliott Business College. He took up the profession of writing, becoming a reporter on the Wheeling Intelligencer. He later became editor of that newspaper and then editor of the Wheeling Register.

When the Mexican Revolution started in 1912, Caddle was lured to the Border. He became war correspondent for the El Paso Times and was with General Villa in most of the more prominent engagements waged by that former bandit chief. He later became editor of the El Paso Times and resigned to accept a position as war correspondent in Mexico for the New York Herald. At the conclusion of hostilities in that country he came to New York where he worked on the editorial staff of the New York Herald, covering general assignments, until the merger of that newspaper with the Tribune.

For nearly a year Mr. Caddle worked for an advertising agency and then became assistant to the manager of the Copper & Brass Research Association.



B. B. CADDLE

William Zorn, formerly welding engineer of the Detroit Edison Company, has joined C. H. Dockson Company of Detroit, Mich., as welding engineer.

George W. Thornburg, Crescent Park Brass Foundry, Waltham, Mass., has been elected president of the New England Foundrymen's Association.

Lewis W. Douglas, formerly Director of the Budget of the United States, has been elected vice-president and a director of the American Cyanamid Company, 30 Rockefeller Plaza, New York City.

Charles R. Sherman has been appointed vice-president of the Ault and Wiborg Corporation, 75 Varick Street, New York. Mr. Sherman brings with him a long and varied experience and a fine record of accomplishment in the paint, varnish and lacquer industry.



CHARLES R. SHERMAN

William D. Galpen, formerly with E. F. Houghton and Company, Philadelphia, Pa., covering the Metropolitan District, is now with MacDermid, Inc., Waterbury, Conn. Mr. Galpin will cover the Metropolitan territory for MacDermid. His headquarters will be at 725 East 149th Street, N. Y.

Wilfred S. McKeon, better known to the plating industry as "Liquid Sulphur Mac", of Greenburg, Pa., sailed on the Munson Liner Munargo on Friday, February 8th for the Bahamas and Cuba. He will stop over a couple of weeks in Miami, and will spend possibly a month in Cuba. Mac will see to it that Cuban platers will be properly prepared to do their copper and silver oxidizing now!

Carl G. de Laval has been appointed sales representative of Electro Metallurgical Sales Corporation in the Pittsburgh district, effective February 1. Since 1925 Mr. de Laval has been connected with the production department of Electro Metallurgical Company at the Niagara Falls plant. His new offices will be in the Oliver Building, Pittsburgh.

H. W. Sweatt, for the last eight years vice president and general manager of **Minneapolis-Honeywell Regulator Company,** Minneapolis, Minn., has been made president of the company, according to an announcement made public by the board of directors. He succeeds **M. C. Honeywell,** who has served as president since the merger of the Minneapolis Heat Regulator Company and the Honeywell Heating Specialties Company in 1927. Mr. Honeywell becomes Chairman of the Executive Committee.

Obituaries

George H. Christensen

George H. Christensen, New Jersey representative for the Magnus Chemical Company, Garwood, N. J., died suddenly on Wednesday, January 9th, 1935, of cerebral apoplexy. He was not gifted with a robust constitution, but the end came with little indication, other than a slight complaint of not feeling quite up to the mark on that morning.

Mr. Christensen was a graduate of Montclair High School. He went to work in the blue printing business which his father operated under the name of H. B. Christensen Company, the original blue print manufacturer in America. This business was later sold to the New York Blue Print Company.

After staying with the business a year after the sale, Mr. Christensen spent a year with the Manhattan Dredge Company as draughtsman. About this time he decided upon a career for himself in selling work. Therefore, he eagerly seized an opportunity to represent the



G. H. CHRISTENSEN

Atlas Steel Castings Company of Buffalo, N. Y., travelling for them through New England, New York and New Jersey for years.

At this time he made his advent into the cleaning material business when he became associated with Wilfred McKeon. In 1922, shortly after the formation of the Magnus Chemical Company, Mr. Christensen was invited to join that concern, which he served right up to the time of his sudden death.

He leaves his wife, Mrs. Elsie Christensen, and a daughter, Beatrice, at home in Glen Ridge, N. J.

Among the comments which were made about Mr. Christensen, one stands out: "One could wish no greater reward for a well-spent life than to leave behind the regard we all hold toward him—a kind and sincere friend."

Olin D. Stuart

Olin D. Stuart, 60, died of a heart attack, on January 13, 1935, in his home, 484 Wellington Avenue, Rochester, N. Y. He was a member of the Stuart-Olver-Holtz Metal Finishing Company of Rochester.

Mr. Stuart was a native of St. Catherine, Chemung County, where he was born January 1st, 1875, son of Sylvester Stuart. He came to Rochester about 35 years ago and engaged in the metal working industry, forming a partnership with Roy B. Olver, under the name of Stuart-Olver Company. Later the partnership included George F. Holtz, under the present name. Mr. Stuart married in Buffalo, just previous to coming to Rochester, Miss Minnie M. Guyer of that city, who survives him. He also leaves a son, Albert T. Stuart, and a grandson, of this city; a brother, Clarence Stuart of Elmira; a half-brother and three half-sisters. In addition to membership in the Chamber of Commerce and Kiwanis Club, Mr. Stuart was a member of Corinthian Temple Lodge, 805, F. & A. M.; Hamilton Chapter 62, R. A. M.; Lalla Rook Grotto 3, M. O. V. P., Cyrene Commandery K T. and Woodmen of the World.

Charles Goldfarb

Charles Goldfarb, proprietor of the Western Chromium Plating & Polishing Company, 433 S. 5th Street, Brooklyn, N. Y., died at his home at 222 Penn Street, Brooklyn, on December 3, 1934, at the age of 51.

Mr. Goldfarb was one of the well known figures in the electroplating industry in Brooklyn. He started the Western company 15 years ago and built it up to a busy and prosperous organization. Previously he had gained his experience as a foreman for the Weir Stove Company, Taunton, Mass., and Durst Manufacturing Company, New York, having spent many years with these concerns. Mr. Goldfarb was universally respected for his integrity in business and the quality of his products. Among his friends he was a genial, kindly companion and whenever called upon, a friend in need. To his family he stood as the protector and devoted father and husband, whose loss at such an early age is a tragedy.



CHARLES GOLDFARB

Mr. Goldfarb leaves a widow Mrs. Mary Goldfarb, two sons, Morris and Joseph Goldfarb who are carrying on the business of the Western Chromium Plating & Polishing Company in the tradition of their father, and three daughters, Mrs. Ethel R. Wesley, Mrs. Anne Goldberg and Miss Bessie Goldfarb.

James V. Martin

James V. Martin, for many years sales engineer for the Monarch Engineering & Manufacturing Company, Baltimore, Md., died during the week of January 21st, after a short illness.

John B. Ripley

John Butler Ripley, president of the J. B. Ripley Brass Foundry, Inc., Windsor, Vermont, died in that city on December 22, 1934. Mr. Ripley was born in St. Johnsbury, Vt., December 30, 1861, and in 1919 went to Windsor where he established the foundry business which is now known as the J. B. Ripley Brass Foundry, Inc. He is survived by his wife, Addie M. Ripley, one brother, Ned D. Ripley of Bennington, Vt., and an uncle, R. G. Cheney of Springfield, Mass.



JOHN B. RIPLEY

Michael D. Hogan

Michael D. Hogan for many years with the Zapon Company, Stamford, Conn., died on January 7th, following an operation for appendicitis, at 42 years of age.

Mr. Hogan was a native of Stamford. He entered the employ of the Zapon Company in 1904, and remained with them since that time, except for a period when he enlisted in the Navy during the war and went overseas, seeing active service. He worked in many depart-

ments and mastered the lacquer business in every detail.

Mr. Hogan was known to be one of the most progressive men in the industry. For the past ten years, he had specialized in the problems of the lacquer industry and was an invaluable consultant to the metal manufacturing and furniture industries. He was responsible for many of the new developments in lacquers. His keen interest and ability helped many manufacturers to overcome knotty finishing problems.

Mr. Hogan leaves a widow and one son.

John T. Baker

John T. Baker, chairman of the board of the J. T. Baker Chemical Comany, died suddenly at Lake Wales, Fla., recently. Mr. Baker, who was 74 years old, was stricken on the golf course at Lake Wales, where he was spending the winter, as has been his custom for many years. He was removed to his cottage where he succumbed a short time later. He was graduated from Lafayette College in 1882. His widow survives. An only son, Lieutenant Elbert Curtis Baker, after whom the Veterans of Foreign Wars post here is named, was killed in action during the World War.

John A. Schultz, Jr.

John A. Schultz, Jr., president, Schultz Die Casting Company, Toledo, Ohio, died December 27, 1934, after a short illness. Mr. Schultz founded the Schultz company in 1930. Previous to that time he was vice-president of the Doehler Die Casting Company of Toledo. He served as president of the Merchants and Manufacturers Association of Toledo, and was prominent in other activities.

Industrial and Financial News

News of the Codes in the Metal Industries

Electro-Plating

The following District Code Committees have been approved by the Administration:

District VIII. **M. G. Herbach** and **Harry Long,** Philadelphia, Pa.; **August Borleis,** Baltimore, Md.; **B. Bromwell,** Washington, D. C., and **R. N. Thomas,** Wilmington, Dela.

District III. **Fred Hau,** Racine, Wis.; **I. M. Herrmann** and **Joseph Bykowski,** Milwaukee, Wis.; **R. Peterson,** Minneapolis, Minn., and **B. Kerr,** Des Moines, Iowa.

District X. **S. Nowak,** Buffalo, N. Y.; **A. W. McGuire** and **O. D. Stuart,** Rochester, N. Y.; **James Franklin,** Buffalo, N. Y., and **Charles Kinsman,** Binghamton, N. Y.

Brass and Bronze Alloy Ingots

John Hopp, Chicago, Ill., has been appointed to the Code Authority to replace **Kern Gill,** resigned.

Metal Developments

According to the **U. S. Consular Service** two new aluminum plants are being planned in Europe, one in Holland and one in Sweden. A/S Norsk Aluminum Company has organized an affiliated stock giving the A/B Svenska Aluminiumskompaniets Fabrikk and has put up a factory at Maansbo, Dalarne, with an actual capacity of 1800 tons.

Aluminum has not as yet been made a part of opera costumes according to Geraldine Farrar the famous American singer. In her radio broadcast February 2 from the Metropolitan Opera House, New York, Miss Farrar in describing the opera Valkyrie said the singers were still weighted down with heavy steel helmets, shields and armor and she thought the feminine nightingales anyway would welcome a metallic dress of lighter weight.

New York safe crackers took off with $20,000 in silver from the plant of the **Elgin Silversmith Company,** 40 W. 17th Street, New York. The silver was in the form of circles, blanks, seams and rolled stock, to be used in making candle sticks, salt cellars tops and trophy cups.

Andrew E. McNeely, president of the firm of bell founders in Watervliet, N. Y., of that name, recently discovered that an old church bell in Fayetteville, N. C., had been made 103 years ago by **O. O. Hanks,** his great-grandmother's cousin and the founder of the McNeely Bell Company.

Industrial fatalities in the United States rose 7 per cent in 1934. All types of accidents rose 8.7 per cent. All accident fatalities increased from 91,087 in 1933 to 99,000. Occupational accidents in 1934 claimed 15,500 lives. Motor vehicle deaths rose to 35,500, a gain of 13 per cent, to establish a new record in highway slaughter.

Now here is a case that proves how unnecessary and avoidable accidents are. On November 1, 1934, the Western Clock Company, La Salle, Ill., a member of the National Safety Council employing 2,300 persons had amassed the grand total of 10,029,681, accident-free hours, a record, from December 17, 1931 and still continuing.

Bertram B. Caddle, secretary of the **Copper and Brass Research Association,** 25 Broadway, New York, recently reported that a survey by the Field Division of the Federal Housing Administration showed that 16,000,000 buildings in the United States are in need of repairs out of a total of 29,000,000. **W. M. Canaday,** Director of Public Relations of the **Federal Housing Administration** estimates that the total normal repairs incompleted from 1929 to the present time amounts to nearly $15,000,000. What a back-log of pending business! Too bad it's still largely pending.

Laminated metal strips consisting of stainless steel with a veneer of gold welded to each face have recently been perfectd by the **General Plate Company,** Attleboro, Mass. The material is recommended for dental work and many types of jewelry.

A new high speed machine built by **E. Castaneda, Calle De Tapia,** 1708 Pte., Monterrey, N. L., Mexico, die casts lead seals for mail pouches, express packages, etc., at the rate of 6,000 an hour. It is also stated that since the machine is fully automatic, only one man is required to take care of five in a battery.

The **Birmingham Aluminum Casting Company Ltd.,** Birmingham, England, has patented an aluminum silicon alloy called Birmasil Special, a mixture containing 2.5 to 3.5 per cent nickel; also Birmal pressure die casting alloy containing 1.75 to 2.5 per cent nickel. Another special alloy contains about 1½ per cent nickel.

The International Nickel Company, New York, points out that the search for iron free chemicals such as caustic soda, phenol, alum, etc., has greatly increased the use of nickel and nickel clad steel in the equipment used.

Sheets of zinc and steel are now being fused together so that there is no definite dividing line between by the **Inland Steel Company,** Chicago, Ill. It is stated that these sheets may be stamped, drawn, spun, etc., without flaking off the zinc coating.

Motor Boat Show

The National Motor Boat Show was held in New York, January 18-26, 1935, at Grand Central Palace, New York. The outpouring of visitors and the sales consummated were the most encouraging in recent years. As usual metals and alloys played a most important part in many of the exhibits, especially along the line of corrosion-resistant material. Among the exhibitors were:

American Brass Company, Waterbury, Conn. Ambrac, Everdur, Tempalloy, Tobin bronze, copper and brass in various types of fabricated forms; fittings, tanks, etc.; also copper base alloy pressure die castings.

Columbian Bronze Corporation, Freeport, L. I. Propellers, rudders and a variety of accessories.

Jos. Dixon Crucible Company, Jersey City, N. J. Graphite, lubricants and the Graph-Air Gun for lubricating moving parts.

Federal Mogul Corporation, 301 Shoemaker Avenue, Detroit, Mich. Copper alloy cylinder heads, propellers, accessories.

Harrison Radiator Corporation, Lockport, N. Y. Copper radiators for marine and industrial purposes.

Hyde Windlass Company, Bath, Maine. Propellors.

International Nickel Company, 67 Wall Street, New York. Monel metal and Inconel.

L. O. Koven and Brothers, Inc., 154 Ogden Avenue, Jersey City, N. J. Cans, tanks, etc.

M. L. Oberdorder Brass Company, Syracuse, N. Y. Bushings, bars, castings, etc., made of brass, bronze, aluminum and other non-ferrous alloys.

Census, Nonferrous Alloys and Products

Wage-earner employment in the manufacture of nonferrous-metal alloys and products in the United States (not including aluminum) increased considerably during the spring and summer of 1933 and decreased somewhat in the fall, but remained at a much higher level in December than that attained in March, according to a preliminary report compiled from data collected in the Biennial Census of Manufactures taken in 1934, released by Director William L. Austin, Bureau of the Census, Department of Commerce. The report shows 36,790 wage earners on the pay rolls in March, 42,310 in June, 51,109 in September, and 47,576 in December.

The total value of products made by establishments engaged primarily in the manufacture of nonferrous-metal alloys and products in 1933 amounted to $239,155,936 (at f. o. b. factory prices), as against $331,438,974 reported for 1931 and $909,804,050 for 1929. The rates of decrease for the two biennial periods are: 1931-1933, 27.8 per cent; 1929-1931, 63.6 per cent. The principal items contributing to the 1933 total are: Plates and sheets, $58,524,377; rods, $31,095,824; tubing and pipe, $23,901,960; ingots and pigs, $18,991,184; rough castings, $21,692,912.

This industry, as defined for census purposes, embraces establishments engaged primarily in the production of (a) nonferrous alloys, (b) products made of nonferrous alloys, and (c) products made of nonferrous metals other than aluminum, except products of classes (b) and (c) specifically assigned to other industries. The chief classes of nonferrous products thus assigned are wire and wire products, plumbers' supplies, electrical apparatus, lighting equipment, structural and ornamental metal work, hardware, and screw-machine products. These products are not covered by this report except to the extent to which they are manufactured as secondary products by the establishments classified in this industry. The complete report can be obtained from the Department of Commerce, Washington, D. C.

Business Items-Verified

Spray Engineering Company, 114 Central Street, Somerville, Mass., announces that since the adoption by the company of the name Spraco, Inc., in 1928, there has been considerable confusion in the minds of its customers, and business is now being carried on under the name of the Spray Engineering Company. This change is in name only and does not affect the organization, the financial structure of the company or policy.

The **Stanley Works,** New Britain, Conn., has adopted the American Brass Company's new beryllium copper in the production of workmen's tools. Beryllium copper is expected to be an important factor in eliminating fire or explosion hazards in mines and factories where danger from sparks prevails. The Stanley Works is co-operating with the Beryllium Products Company in the adoption of the new metal to different uses. The following departments are operated: tool room, rolling mill, stamping, zincing, tinning, plating, polishing, grinding room, lacquering and japanning.

Metal Products Corporation, 510 First Avenue, New Haven, Conn., announces the receipt of two large contracts to manufacture metal cash boxes to be used by two of the largest chain store companies in the country. A. R. Stieler, president of the concern, states that the increased business will mean the hiring of between 12 to 18 persons. The company intends to erect an addition, 30 x 110 ft. to present structure. The following departments are operated: tool room, stamping, grinding room, lacquering, japanning.

Jenkins Bros., 80 White Street, New York City, manufacturers and dealers in bronze, cast steel and iron valves, rubber sheeting packings, pump valves, gaskets and rubber specialties, have joined the American Standards Association as company members. As ASA members they are entitled to free copies of all standards published by the American Standards Association, a discount on all approved American Standards, free subscriptions to Industrial Standardization and Commercial Standards Monthly, and special information service from the ASA library. The following departments are operated: bronze, brass and aluminum foundry; brass machine shop, tool room, casting shop, plating, polishing, grinding room, lacquering and japanning.

The Jeweled Cross Company, Attleboro, Mass., has acquired 2,000 additional square feet of factory space. This firm operates the following departments: casting shop, soldering and lacquering.

The **Canadian Bronze Company,** Montreal, Canada, has purchased the railway bearing manufacturing business of the Robert Mitchell Company. The Canadian company operates the following departments: brass, bronze and aluminum casting.

Gilby Wire Company, Newark, N. J., has changed its name to **Wilbur B. Driver Company.** This change is in name only.

Revere Copper and Brass, Inc., Rome, N. Y., has constructed a new research laboratory, at Rome, and a new casting shop at New Bedford, Mass. The following departments are operated: tool room, casting shop, rolling mill, cutting-up shop, stamping, tinning, soldering, brazing, plating, polishing, grinding room and lacquering.

E. I. duPont de Nemours and Company, Inc., Wilmington, Dela., has opened its new medical laboratory to be known as the Haskell Laboratory of Industrial Toxicology, the purpose of which will be to test thoroughly, from a health standpoint, all products produced by the company before they are placed on the market.

M. E. Baker Company, 79 Haverhill St., Boston, Mass., have taken an additional warehouse (larger space) at Beverly Street in Boston in conjunction with their present warehouse facilities. The new addition will enable them to have a carload siding and more up-to-date warehousing facilities. At present they have one of the largest and most complete stocks of used, late design, rebuilt, electro plating, polishing and tumbling barrel equipment in the East.

Arrangements have been completed with the **Birmingham Electric Company** of Birmingham, England, for the manufacture and sale in Great Britain, the British Empire and certain other European countries, of the Detroit rocking electric furnaces, made by the **Detroit Electric Furnace Company,** Detroit, Mich. This furnace will be manufactured and sold abroad under the name of "Birlec Detroit Rocking Furnaces."

New Incorporations

Carson Foundry and Manufacturing Company, Tecumseh, Mich., has been organized by D. J. Carson, Tecumseh, and associates, to manufacture stock feed cookers, caldron kettles, tank heaters, stoneboat heads, hog troughs and fine gray iron castings. The firm operates a casting shop.

Carl E. Swift Corporation, Holland, Mich., has been organized to manufacture electric washing machines and other appliances. The officers are: Carl E. Swift, president; E. G. Landwehr, vice-president and treasurer; Henry I. Stimson, secretary, and Frank E. Stearns, works manager.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

February 1, 1935.

Lane McLean, representing the **Sperry Corporation** of New York, has announced the purchase by his company of the stock of the **Waterbury Tool Company.** The purchase was effected in Montreal where **Francis H. Clergue,** principal owner, resides. The local company has about 100 employees, all of whom from the superintendent down, will be retained. Products of the company include oil gears and variable transmission units, used in most naval vessels of the world. New officers of the company elected after the purchase are: President, **Capt. Thomas B. Doe,** who is vice-president of the Sperry Corporation; Vice Presidents, **John Sanderson** and **Lane McLean.** Mr. Sanderson is vice-president and treasurer of the Sperry Corporation. All reside in New York but Mr. McLean will move here to take general charge of the concern. The Sperry Corporation has a factory in Brooklyn, N. Y., and manufactures gyroscopic devices and other instruments used on ships and airplanes.

It is expected that the **Steele & Johnson Manufacturing Company** plant will be closed soon and the business and machinery acquired by the **Chase Companies, Inc.** The latter and its parent company, the Kennecott Copper Company owns a large block of stock in the other concern. It is expected that the machinery will be moved to the **Waterbury Manufacturing Company,** division of the Chase Companies, or to the Chase plant in Waterville. It is understood that **Benjamin L. Coe,** president, and **Benjamin S. Coe,** secretary, treasurer, and general manager of the company will become part of the Chase organization. Some of the 400 employees have already been released permanently but most of the rest are expected to be given employment at the Chase plants.

The company was formed in 1858 by **Elisha Steele.** Its products have been screw machine products, eyelets, plumbing and electrical supplies and novelties. Similar products are made by the **Waterbury Manufacturing Company.**

John H. Gilbert, formerly with the **Kennecott Copper Company** but for the last six months employed by the **Chase Brass & Copper Company,** was elected assistant treasurer of the **Chase Companies, Inc.** at the annual meeting last month. Other officers were reelected as follows: President, **Frederick S. Chase;** Vice Presidents, **Robert L. Coe** and **Richard D. Ely;** Treasurer, **Richard D. Ely;** Secretary, **Charles E. Hart;** Assistant Secretary, **Rodney Chase;** Controller, **W. A. Purdy.** Directors were reelected as follows: **F. S. Chase, Irving H. Chase, R. D. Ely, R. L. Coe, F. A. Jackle, Rodney Chase, J. R. Van Brunt, E. T. Stannard, C. T. Ulrich** and **Charles E. Hart.**

Charles B. Jackson was elected a new director of the **Lux Clock Company** at the annual meeting last month. **Arthur A. Tanner** was reelected chairman of the board and **Paul Lux,** reelected president and treasurer. Other officers were elected as follows: Vice Presidents, **Alexander H. Hauser** and **Herman J. Weisman;** Secretary, **Herman F. Lux;** Assistant Secretary and Assistant Treasurer, **Fred Lux.** Directors include the above and **Frank Hayes, John J. Walsh, William Riether** and **Carl Weyand.**

A plan for reorganization of the **Beardsley & Wolcott Manufacturing Company** has been submitted by the trustees to **Federal Judge Carroll C. Hincks.** The plan is in accordance with the provisions of the new federal bankruptcy act. The trustees include **Lyle A. Brown** of Boston, representing most of the creditors, **Francis T. Phillips,** representing the stockholders, and **Thomas P. Kelly,** representing the city which has a large tax claim against the concern. If the plan is approved by the stockholders and creditors the concern will continue business with new capital.

The **Manville Machine Company** is operating three shifts, due largely to a contract from the **Ford Motor Company** for machinery for the Rouge River plant which is being expanded. Orders on hand are sufficient to keep the company operating at capacity until July.

Edward O. Goss, president of the **Scovill Manufacturing Company** and chairman of the Code Authority of the Copper and Brass Mill Products Industry, has informed the NRA that the industry is anxious to retain the provisions in the code respecting distributors and open price filing.

"In the period during which the code has been in operation the industry has achieved results which many years of effort had not been able to achieve," he said. "At the present time credit terms are uniform and are equally available without preference to all customers. Uniform contract terms and conditions have been put into effect which render impossible the granting of concealed favors and the highly injurious practice of price protection which, prior to the code, was prevalent throughout the industry. The experience with the open price provision has been that it has not in any way tended toward rigidity of prices. Outside of the higher prices brought about by the increased cost of copper under the copper code, prices in the copper and brass mill products industry have been downward. In no industry is the open price provision more vital to prevent disorganization and undesirable and unfair practices than in the copper and brass mill products industry."

W. R. B.

Connecticut Notes

February 1, 1935.

HARTFORD—The **Chance-Vought Corporation** of this city, subsidiary of the **United Aircraft Corporation** has been awarded a contract for 84 bombing planes for the Navy at a contract price of $1,804,800 exclusive of the engines and propellers. The business will keep the concern busy for a year. The engines will be made by the **Pratt & Whitney Company** and the propellers by the **Hamilton Standard Propeller Company,** both of this city. Their cost will be about $700,000.

The **Standard Screw Company** paid a dividend of 1 per cent on the common stock Jan. 1. This amounts to $1 a share, or double the previous payment. The regular semi-annual dividend of $3 a share was paid on the preferred Jan. 2.

NEW BRITAIN—Over $571,500 in dividends was distributed by the six largest local plants Jan. 1st. **Landers, Frary & Clark** paid $157,000; **American Hardware Corporation,** $124,000; **Stanley Works,** $130,000; **Fafnir Bearings Company,** $90,000; **North & Judd,** $25,000 and **Hart & Cooley,** $45,000.

C. F. Bennett, president of the **Stanley Works,** has been elected president of the **New Britain General Hospital.**

MERIDEN—**Clifford R. Gardinor,** president of the **International Silver Company,** has completed 25 years service with the concern which he entered as purchasing agent. **C. E. Breckenridge,** a member of the board of directors of the company, and a manager of the New York office until 1925, died last month in Pasadena, Calif.

Milton L. Gearing, manager of the **Meriden Division** of the **New Departure Manufacturing Company,** has been elected president of the Manufacturers Association of Meriden.

MIDDLETOWN—**George M. Williams** was reelected president of the **Russell Manufacturing Company** at the annual meeting last month. The stockholders authorized the directors to sell various unused factory buildings in scattered sections of the town acquired during the war time expansion. It was reported that the company is again making parts for the **Ford Motor Company** for the first time in three years.

The **Remington-Noiseless Typewriter Company** of this city celebrated its 26th anniversary last month, originally the **Middletown Noiseless Typewriter Company,** formed by **Edward C. Clark, Wellington H. Kidder** and **Lucius H. Robinson** in 1909.

WINSTED—The **Strong Manufacturing Company,** makers of casket hardware, has been sold to the **Textile Manufacturing Company** of Westfield, Mass. The machinery, molds and dies are expected to be shipped to the latter city. The company has had 100 employees but recently the number dropped to half that. Some of them will go to Westfield. **Ernest F. Sweeney,** assistant secretary and treasurer of the local concern, who has been with it 50 years, will remain here for a time superintending the removal.

WALLINGFORD—**R. Wallace & Sons Company** last month observed the 100th anniversary of its organization. A centennial medal was struck for the occasion and a banquet given the veteran employees. The annual convention of the company's salesmen was held in conjunction with the anniversary celebration.

NEW HAVEN—The **Metal Products Corporation,** has had plans drawn for a one-story factory addition, 30 by 110 feet.

BRISTOL — The **Wallace Barnes Company** has increased capital from $2,040,000 to $2,500,000 by issuing 4,600 additional shares of par value of $100.

The **Dunbar Brothers Company** has increased its capital from $150,000 to $250,000 by issuing 100 additional shares par of $100.

TERRYVILLE — Twenty-five employees of the screw department of the **Eagle Lock Company** went out on strike last month because they were notified that each would work 30 hours every two weeks instead of 30 hours every week. They came back to work when the company announced a return to the former schedule. W. R. B.

Providence, R. I.

February 1, 1935.

Rhode Island labor leaders have presented to the General Assembly now in session a sixteen-point legislative program proposing far reaching changes in the State's existing laws relating to labor and other industrial subjects. The program was drafted by the legislative committees of the State Branch of the American Federation of Labor, the Providence Central Federated Union and the United Textile Workers of America. In addition to indorsing the old age pension plan, unemployment insurance, the child labor amendment, a forty-hour working week in place of the present State law allowing a fifty-four hour week; enactment of an anti-injunction bill and other labor bills, the committees indorsed legislation giving to the Governor the right to send National Guard troops into any municipality or withdraw them without waiting for the recommendation of local authorities, and a bill providing for the election of sheriffs in each of the five counties of the State by popular vote.

A dividend of fifty cents a share has been declared by the **Gorham Manufacturing Company** on its common stock.

The **Columbia Metal Stamping Company** of Providence, has been granted a charter to conduct a manufacturing jewelry business with an authorized capital consisting of 10 shares of common stock of no par value. The incorporators are: **Joseph Revelli, James Ambrifi,** and **Archie Lambias,** all of Providence.

Edward O. Otis, Jr., has resigned as secretary of the **New England Manufacturing Jewelers' and Silversmiths' Association** to enter the jewelry industry as a manufacturer, although he still remains as treasurer of the Code Authority and will continue to be identified with the code administration. **William H. N. Lake,** who has been Mr. Otis's assistant for the past year, has been appointed as acting secretary of the organization. Mr. Otis has purchased the plant of the Wachenheimer Bros. Inc., manufacturing jewelers at 36 Garnet street, Providence.

The **Bettinger Enamel Corporation** has been awarded judgment for $141.29 and costs in Sixth District Court in a case of asumpsit against the **C. F. Duby Manufacturing Company.**

The **Cathedral Art Metal Company** of Providence has just completed two notable sacred vessels, designed by **P. A. Tracey & Company,** Providence, for the Holy Name Chuch at Roxbury, Mass., an ostensorium and a chalice. The ostensorium stands 26 inches high, weighs 200 ounces and is made entirely of 14 kt. gold and sterling silver. The cross which surmounts the whole has the centre studded with nine large diamonds and twenty small ones. The diameter of the back rays is 18 inches. The chalice, standing ten inches high, is likewise made of 14 kt. gold. On the upper part of the calyx is the inscription —"Hic est enim calix sanguinis mei."

James De Cesaris of 342 Union avenue, has filed a statement that he is the owner of the **Progressive Manufacturing Company,** manufacturing jewelers, rear of 226 Eddy street.

Walter M. Sanders, Jr., of Providence, has been elected a member of the executive committee of the **New England Foundrymen's Association.**

W. H. M.

Middle Atlantic States

Newark, N. J.

February 1, 1935.

Testimony and argument for and against the constitutionality of the fabricated metal code of the NRA has been continued before **Federal Judge Fake,** who has been petitioned by a number of the metal trade to grant an injunction against the code authorities. **Acme, Inc.,** of Newark, is the concern attacking the code authority, alleging the code threatens to deprive the company of liberty and its property without due process of law. It was testified that the code authorities demanded a certified copy of the concern's payroll, which the company refused, and was threatened with prosecution.

Changes in management of the Newark works of the **Westinghouse Electric & Manufacturing Company,** have been announced by **President F. A. Merrick. L. E. Osborne,** formerly Newark works manager, has been appointed manager of the Westinghouse small division at East Springfield, Mass., in charge of engineering, manufacturing and sales. **R. M. Rumbel,** formerly service manager of the central sales district, with headquarters at Pittsburgh, has been appointed works manager at Newark.

Following Newark concerns have been incorporated: **Eastern Basic Chemical Company,** $15,000; **Celluweld Development Corporation,** chemicals, 1,000 shares, no par; **Markovitz & Weber, Inc.,** chemicals, 2,500 shares, no par. C. A. L.

Trenton, N. J.

February 1, 1935.

Metal industries feel encouraged by the demand for various kinds of hardware and believe that is an indication that business is improving. Jobbers report that this line showed a big improvement over last season. **The Capitol Welding Company,** 138 Laberton Street, Trenton, whose plant was recently destroyed by flames, has rebuilt the factory. **Harley A. Hulslander** is having a two story addition built to his engraving plant on North Stockton Street. The **American Steel & Wire Company** is operating with a full force in the copper wire department.

Following concerns were chartered here: **Fanwood Chemical Company, Inc.,** Fanwood, $5000; **Krouse-Doremus Foundry Company,** Clifton, 500 shares no par; **Sheet Metal Products, Inc.,** metal, East Orange, 500 shares no par; **Edco, Inc.,** metal products, Vineland, $125,000; **Nodel Corporation,** Hoboken, electrical products, $125,000.

C. A. L.

Middle Western States

Detroit, Mich.

February 1, 1935.

The past four or six weeks probably has been the most active the non-ferrous metal industry has experienced in the last three or four years. This also applies to the plating industry.

Most of the activity, is traced to the motor car industry which now is getting into substantial production. The motor exhibitions held in Detroit and

throughout the country of late, have decidedly stimulated the industry and every one now is looking for increases that will set new records.

Although production is sharply increased, it has not made the showing in employment that was anticipated. New labor saving machinery and new methods of doing things, while boosting production, have made it possible to reduce the number of workers. Better motor cars also are being made and those going on the market at this mid-winter time far exceed those of any other period when it comes to refinements, workmanship and materials.

Accessory manufacturers in Detroit, as well as in the surrounding industrial centers, are speeding up from day to day. The plating plants also have fallen in line and already are making a good showing.

Manufacturers of plumbers' and steam fitters' supplies have not been active for a long time.

Production of air conditioning units and refrigerators is steady. This industry has as promising a future as any in this area.

Parker-Rust Proof Company, 5203 Martin avenue, has purchased the **Stone Enameling Company,** 2531 Scotten avenue, according to Charles H. Awkerman, president and general manager of the former company, "The addition of facilities and equipment will increase production capacity of our organization 50 per cent," he said. "Additional washing machinery and 'Bonderizing' equipment will be installed at the Scotten avenue plant which will provide facilities for handling 1,200 sets of automobile sheet metal parts daily."

Milton E. Chandler, vice president of the **Stromberg Carburetor Company,** a subsidiary of the **Bendix Aviation Corporation,** at South Bend, Ind., has joined the **Holley Carburetor Company,** at Detroit, together with approximately a dozen associates from the Stromberg company. A reorganization and expansion of the activities of the Holley Co. is contemplated, it is said.

With the announcement by the **Federal Mogul Corporation** here, of a line of cadmium-silver-copper alloys, a new type of high-load capacity bearing metal, enters large-scale automotive production. The function of the new-bearing metal is to provide bearings which maintain their "strength" better than babbitt at the high-operating speeds, high-crankcase temperatures and the high-bearing loads encountered in modern engines.

The **W. B. Jarvis Company,** Grand Rapids, manufacturers of automobile hardware, is reported practically at its old-time peak with 1,300 men employed. Last minute rush for equipment to be used in 1935 models was given as the reason for doubling employment a short time ago.

Approximately 4,000 men are employed at the foundry of the **Chevrolet Motor Company,** in Saginaw, in the manufacture of parts for the 1935 models. They are working on a five-day weekly schedule which is expected to be boosted as production increases.

The **Norge Corporation,** at Muskegon Heights, has started production on a large order for refrigeration cabinets which evolves full employment for 1,700 persons, it is stated. New machinery also has been installed.

The **Ford Motor Company's** plant at Northville, Mich., turning out valves, is employing 270 persons on three shifts, it is announced.

Four plants operating as subsidiaries of the **Borg-Warner Corporation,** have been made divisions of the parent organization through the transfer of title, it is announced. Purpose of the change was to simplify office accounting. Companies concerned are: the **Detroit Vapor Stove Company,** the **Detroit Gear and Machine Company,** the **Norge Corporation,** and the **Long Manufacturing Company.**

Frederic B. Stevens, Inc., has acquired the plant and business of the **Columbian Facing Mills,** of Buffalo, N. Y., according to **W. J. Cluff,** president of the Stevens organization. The Buffalo concern has been catering to the foundry industry in the eastern section of the United States for about 40 years. "Operation of the foundry facing mill at Buffalo will be conducted by Frederic B. Stevens, Inc.," Mr. Cluff said. "The mill is a part of the plant. Acquiring the Columbian Facing Mills is in harmony with the expansion policy of our company, which operates a large foundry facing plant in Detroit." The Stevens organization also has branches at Windsor, Ont., Toronto, New Haven, Indianapolis and Erie.

F. J. H.

Toledo, Ohio

February 1, 1935.

This city has experienced a decided revival in the metal industry during the last four or five weeks. Motor car acessory plants are taking the lead. Practically all are busy and most of them are engaged full time.

Employment is increasing weekly. This area apparently is facing one of the best manufacturing seasons it has experienced in a number of years. It should be remembered that Toledo has a varied line of industries. Not all are busy of course. Nevertheless the outlook is most encouraging and optimism continues to grow.

F. J. H.

Pacific States

Los Angeles, Calif.

February 1, 1935.

The United States War Department have given an order of $1,655,314 for seventy-one observation airplanes, to the **Douglas Aircraft Company** of Santa Monica. This company now have unfinished orders on their books amounting to $7,000,000.

The **Northrup Corporation** of Inglewood, have received orders from the War Department for 110 attack planes, to cost $1,896,000. This plane is all metal, has a cruising speed of 250 miles per hour and is also made so as to float in rough water.

Mills Alloys, Inc., of 3202 San Pedro St., after six years of litigation, have obtained an interest in the process of using abrasive materials, such as tungsten carbide, used in making bits, for drilling oil wells.

The **Universal Microphone Company** of Inglewood have invented and are making a new microphone for airplanes, so the pilot can make announcements to passengers.

The **Grayson Appliance Company** of Linwood have secured the exclusive license to manufacture electric clocks for gas ranges, through the patent of the **Warren Telechron Company.** About 40,000 of these clocks have been made and shipped all over the world. This concern is the largest manufacturer in the world of thermostatic and time operating gas stove controls.

The **Western Label Company** of 1129 Wall St., are busy on making labels, using metallic foil, mainly gold and silver, which give brilliance, color and lustre, in packaging products.

The **Denison Drainpipe Flusher Company** of this city, are making a two way valve, which was an instant success, in stopping the clogging of pipes by waste and grease.

The **Coleman Lamp & Stove Company** of Wichita, Kan. and Los Angeles, are making a new electric brew coffee maker.

The **State Appliance Service** of 1151 Santee St. are now doing all plating and electric work. H. S.

North Pacific

February 1, 1935.

The **Globe Machinery & Supply Company** of Philadelphia, have appointed the **Paramount Manufacturing Company** of San Francisco, Seattle, Portland and Los Angeles, as their Pacific Coast agents. H. S.

Federated Metals Corporation are at home in their new quarters at 170 W. Massachusetts St., Seattle, Wash., a modern brick and concrete office and warehouse structure covering approximately 20,000 square feet. The Seattle division is under the direction of **Jack Schwartz.** The company distributes a complete line of nonferrous metals and alloys including babbit, solder, tin pipe, fabricated lead products and brass, bronze and aluminum ingots. In addition a large tonnage of scrap metals is graded and shipped to the company's smelters at Tacoma, San Francisco and Selby, Calif., as well as exported to Europe and the Orient. More than twenty employees are engaged at the Seattle plant. H. N. B.

Metal Market Review

February 1, 1935.

Copper remained stationary in price throughout the month. Sales were fair to middling, increases in business being held back by uncertainties about the foreign situation, about the future of price-fixing under the revised NRA which may affect the Code, and the impending ruling of the United States Supreme Court on the gold clause. A meeting of American and foreign producers is now to be held, which it is hoped will "rationalize" American and foreign production.

The primary American producers have agreed to extend the present quota waiver agreement until March 31st.

The Copper Code Authority has published a list of 84 more companies who have signed the Blue Eagle buying agreements since the last list was published on November 16.

According to a preliminary analysis of the copper industry in the United States by the Bureau of Mines, smelter production of copper increased 6% in 1934 over 1933. Total smelter and refinery stocks decreased 23% at the end of the year to 924,000,000 pounds.

Zinc was steady and firm most of the month but slipped from 3.75 to 3.70, Prime Western, during the last week. The United States stocks of metal totalled 119,830 tons at the end of December against 115,852 tons in 1930.

Tin was steady but not overactive, ranging from 50.75 to 51.15, closing the month rather firm at very nearly 51. American consumption of tin in tinplate in 1934 decreased about 13,500 tons to 44,375 tons. There is talk of active investigation into substitutes for tin due to its rising price.

Lead was unchanged at 3.55 until the last few days with fair buying, but dropped to 3.45 in the last two days. Refined stocks in the United States increased during December, 2,523 tons over the previous month and 32,396 tons for the entire year. The total lead shipments for 1934 rose to 379,807 tons, about 32,650 tons above 1933.

Aluminum was unchanged at 22.00. **Nickel** was unchanged at 35.00.

Antimony was rather strong, moving from 13.875 to 14.50.

Silver began at 55 and moved very narrowly throughout the month going down to 54,125 and closing at about that level. No new developments occurred during January.

Platinum sank another dollar per ounce to $33.00.

Scrap Metals were firm and fairly active most of the month; especially aluminum. The demand quickened perceptibly from exporters, brass mills and ingot makers. Aluminum scrap for export continues to hold the center of the stage.

The United States Bureau of Mines estimates secondary copper produced by primary refiners in 1934 at 124,000 tons which is 52% of the domestic primary refined output of 232,300 tons. In 1933 the secondary output was 35% of the primary. Secondary lead output of primary smelters was 34,100 tons in 1934, 11% of the domestic refined primary output. In 1933, primary smelters reported 41,630 tons of secondary lead, 16% of the primary refined metal. The American Zinc Institute estimated the output of secondary zinc for 1934 was 18,886 tons, 6% of the primary; in 1933, at 130,087 tons, 10% of the primary.

Exports of brass scrap in 1934 totalled 30,196 tons, almost double the tonnage in 1933. Imports were negligible.

Non-Ferrous Ingot Metal average prices per pound were as follows, during the twenty-eight day period ending January 25:

Commercial 80-10-10 (1½% Impurities)	9.787c.
Commercial 78% Metal	7.509c.
Commercial 81% Metal	7.781c.
Commercial 83% Metal	8.016c.
Commercial 85-5-5-5	8.263c.
Commercial No. 1 Yellow Brass Ingot	6.508c.

WROUGHT METAL MARKET

The fabricators and mills were assisted considerably by the increase in automobile requirements during January which speeded up their operations perceptibly. Reports from distributors vary. Some report better general business with an increase in household repair work and also Government construction. Others report dullness, due largely to seasonal influences, not abnormal in extent, during the first two weeks, but with some improvement during the latter part of the month.

Daily Metal Prices for January, 1935

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1*	2	3	4	7	8	9	10	11	14	15	16	17
Copper c/lb. Duty 4 c/lb.													
Lake‡ (del. Conn. Producers' Prices)		9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic‡ (del. Conn. Producers' Prices)		9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b. ref.)		7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)		3.725	3.725	3.725	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits		50.75	50.55	50.70	50.55	50.875	51.10	51.125	51.00	50.70	50.50	50.70	50.85
Lead (f.o.b. St. L.) c/lb. Duty 2⅛ c/lb.		3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55
Aluminum c/lb. Duty 4 c/lb.		22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%		35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.		13.875	13.875	13.875	13.875	14.00	14.50	14.50	14.50	14.50	14.50	14.50	14.50
Silver c/oz. Troy, Duty Free		55.00	54.875	54.875	54.625	54.25	54.625	54.625	54.375	54.25	54.25	54.25	54.25
Platinum $/oz. Troy, Duty Free		34.00	34.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
Gold—Official Price† $/oz. Troy		35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

	18	21	22	23	24	25	28	29	30	31	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.													
Lake‡ (del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic‡ (del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b. ref.)	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	3.75	3.75	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.75	3.70	3.728
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	51.00	50.95	50.95	51.00	51.15	50.95	50.70	50.95	50.90	51.10	51.15	50.50	50.866
Lead (f.o.b. St. L.) c/lb. Duty 2⅛ c/lb.	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.45	3.45	3.55	3.45	3.542
Aluminum c/lb. Duty 4 c/lb.	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	13.875	14.364
Silver c/oz. Troy, Duty Free	54.25	54.375	54.375	54.375	54.375	54.375	54.375	54.50	54.125	53.875	55.00	53.875	54.418
Platinum $/oz. Troy, Duty Free	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.00	33.00	33.068
Gold—Official Price† $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

‡ Blue Eagle Copper. † United States Treasury price.
* Holiday.

Metal Prices, February 1, 1935

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.125, Electrolytic 9.00, Casting, 7.50.
Zinc: Prime Western, 3.70. Brass Special, 3.80
Tin: Straits, 51.00. Pig 99%, 50.70.
Lead: 3.55. **Aluminum,** 22.00. **Antimony,** 14.50.
Nickel: Shot, 36. Elec., 35.

Quicksilver: Flasks, 75 lbs., $73.00. **Bismuth,** $1.10.
Cadmium, 55. **Silver,** Troy oz., official price, N. Y., Feb. 5, 53⅞c. **Gold:** Oz., Troy, Official U. S. Treasury price Feb. 5, $35.00. **Scrap Gold,** 6¾c. per pennyweight per karat, dealers' quotation. **Platinum,** oz Troy, $33.00.

Duties: Copper, 4c. lb.; zinc, 1½c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Duty	Import Tax*
Brass Ingots, Yellow	6½ to 8	None	4c. lb.[1]
Brass Ingots, Red	8¼ to 11	do	do
Bronze Ingots	9¾ to 12½	do	do
Aluminum Casting Alloys	15½ to 22	4c. lb.	None
Manganese Bronze Castings	20 to 34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to 38	do	do
Manganese Bronze Ingots	9 to 13	do	4c. lb.[1]
Manganese Copper, 30%	11½ to 16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	10 to 12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	13¼ to 15	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	11½ to 14	do	do
Phosphor Tin, no guarantee	61 to 75	None	None
Silicon Copper, 10%	18 to 30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$35-36.50	None	None
Iridium Platinum, 10%	$36-37.50	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:

	Cents lb.	U. S. Duty	U. S. Import Tax
Heavy copper and wire, mixed	6⅜ to 6⅝	Free	4c. per pound on copper content.
Light copper	5½ to 5¾	Free	
Heavy yellow brass	3⅜ to 3⅝	Free	
Light brass	3 to 3⅛	Free	
No. 1 composition	4⅞ to 5⅛	Free	
Composition turnings	4⅝ to 4⅞	Free	
Heavy soft lead	3 to 3¼	2⅛c.lb.	None.
Old zinc	2¼ to 2⅜	1½c.lb.	
New zinc clips	2¾ to 3	1½c.lb.	
Aluminum clips (new, soft)	12¼ to 13¼	4c.lb.	
Scrap aluminum, cast	9¼ to 10	4c.lb.	
Aluminum borings—turnings	5 to 5½	4c.lb.	
No. 1 pewter	30 to 32	Free	
Electrotype or stereotype	2⅞ to 3	2⅛c. lb.*	
Nickel anodes	30 to 33	10%	
Nickel clips, new	31 to 33	10%	
Monel scrap	11 to 18½	10% a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since November 24, 1934. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16c.	2½c. lb.
Bare wire, soft, less than carloads	12.75c.	25% a. v.
Seamless tubing	16.25c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23.50c.	10% Quality	26.375c.
15% Quality	25.625c.	15% Quality	30.75c.
18% Quality	26.875c.	18% Quality	34.00c.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	14¼c.	15¼c.	16	4c. lb.	U. S. Import Tax
Wire	14¾c.	15¾c.	16½	25%	
Rod	12¾c.	15¾c.	16⅜	4c. lb.	4c. lb. on copper content
Angles, channels	22¼c.	23½c.	24	12c. lb.	
Seamless tubing	16 c.	16¾c.	17⅝	8c. lb.	
Open seam tubing	22¼c.	23½c.	24	20% a. v.	No tax.

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	16¼c.
Muntz or Yellow Rectangular and other sheathing	17⅜c.
Muntz or Yellow Metal Rod	13¾c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.80
Aluminum coils, 24 ga., base price, tons lots, per lb.	30.50

ROLLED NICKEL SHEET AND ROD

Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (Feb. 5) 55¼c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	7.00	2⅜c. lb.
Cut Lead Sheet (base price)	7.25	2⅜c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Brittannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 80.

Supply Prices, February 1, 1935

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast ..... 16½c. per lb.
Electrolytic, full size, 14c.; cut to size 14c. per lb.
Rolled oval, straight, 14½c.; curved, 15½c. per lb.
Brass: Cast ..... 14½c. per lb.
Zinc: Cast ..... .08¼c. per lb.
Nickel: 90-92% ..... .45 per lb.
95-97% ..... .46 per lb.
99%+cast, 47c.; rolled, depolarized, 48.
Silver: Rolled silver anodes .999 fine were quoted Feb. 5, from 56c. per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

Any Quantity

4 to 6	Under ½, $5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	" 5.55	" 5.40	" 5.35
1 to ½	" 5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.
On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted July 2:

16" 20 ply 84/92 Unbleached	$86.21
14" 20 ply 84/92 Unbleached	66.06
12" 20 ply 84/92 Unbleached	49.63
16" 20 ply 80/92 Unbleached	71.02
14" 20 ply 80/92 Unbleached	54.50
12" 20 ply 80/92 Unbleached	41.04
16" 20 ply 64/68 Unbleached	63.43
14" 20 ply 64/68 Unbleached	48.73
12" 20 ply 64/68 Unbleached	36.75

⅛" Sewed Buffs, per lb., bleached or unbleached 49c. to 1.12

CHEMICALS

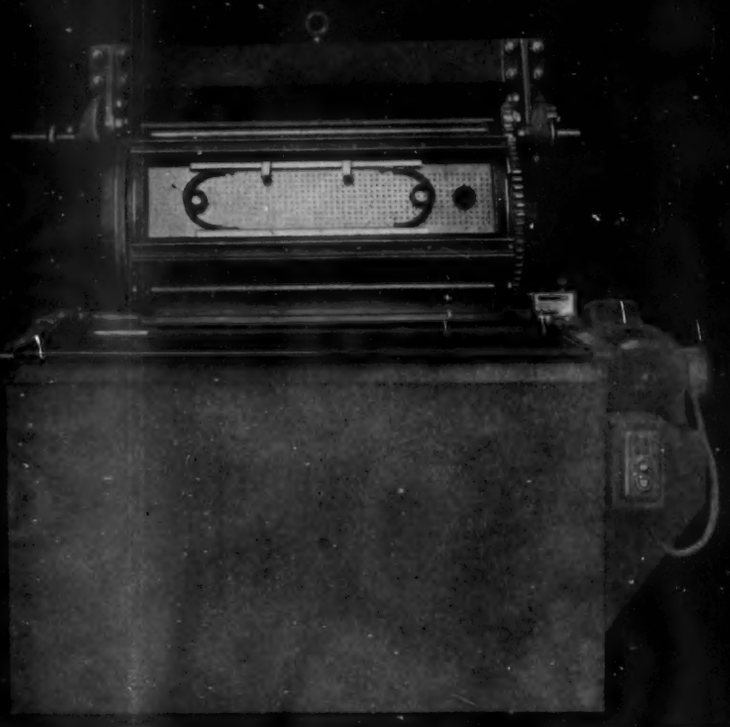
These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.13½-.16
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 400 or 100 lb. drums		.15¾
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.13½-.14½
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	21½-23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.14½-.16½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	4.55-5c.
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) 100% synth., drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13-.14
Salts, double, 425 lb. bbls.	lb.	.13-.14
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07½-.08½
Potassium—Bichromate, casks (crystals)	lb.	.08½
Carbonate, 96-98%	lb.	.08¾
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.48
Cyanide, 100 oz. lots	oz.	.53½
Nitrate, 100 ounce lots	oz.	.40
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride (2NaF. BeF_2)	lb.	4.30-7.00
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.55-3.70
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, drums	lb.	.33½-.36½
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.38½
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.38
Chloride, drums, bbls.	lb.	.07½-.10
Sulphate, bbls.	lb.	.033-.037

* Gold and silver products subject to fluctuations in metal prices.

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